INDUSTRIAL-ARTS MAGAZINE

Volume IX SEPTEMBER, 1920 Number 9

Industrial Education in the Upper Grammar Grades of a Non-Directly-Vocational School

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THIS paper describes an effort to develop a type of shopwork which will be of greatest value to pupils coming from moderately well-to-do homes. While there are in most schools a large majority of children who must leave school early, and for whom an education of the vocational-industrial type should be provided; it is felt that there are also large numbers of schools in middle-class communities where a majority of the pupils will pass on to high schools and other higher institutions. For these it is felt the shopwork need not be of the strictly vocational-industrial kind, and further, that manual training as ordinarily organized and taught has not the educational value that the time devoted to it would seem to justify.

Manual training has been placed in the curricula of various schools at various times, in most cases, for one or more of the following reasons: To develop skill and technique, for the purpose of making articles of use, gaining a knowledge of various materials, thru correlation to motivate other studies, to keep boys in school for a longer period, because of its educational value based upon the culture-epoch theory, its disciplinary value based upon the theory of formal-discipline, and for the purpose of giving an understanding of industry.

The last-named purpose forms the thesis of this paper—that in the upper grammar grades of a non directly-vocational school, *"industries"* should form the basis of the shop activities. Manual training in this sort of a school should take the form of an elementary industrial education—it should be for the purpose of developing a general knowledge of and a sympathetic interest in industries, rather than for the other purposes enumerated above. This is an effort not only to adapt the manual training to the community it serves, but also to make it expressive of modern times. The industries are fundamental in modern life. They are the most essential of man's present-day activities. There is a great volume of common industrial knowledge with which all children should become familiar as a part of their general education. This is part of a movement in education toward a closer relationship between the schools and the daily life of the people about them. This work, being for the purpose of developing a sympathetic understanding and appreciation of modern industry, should be treated more as a science than as an art. Hence shopwork should form but one part of the students' activities—observation, reading, and classwork being equally important. The development of industrial intelligence, not technical efficiency, should determine the content, organization, and method of presentation of this study.

Rather than training in technical efficiency, it should provide an apperceptive mass for these future citizens: First, on the social side, for an understanding and appreciation of (A) the value and dignity of human labor—that this is a world of work, wherein execution, industriousness, and the functioning of knowledge count for success. (B) The rights of others—because of the degree of specialization in the satisfaction of human needs, and the dependence of various groups upon each other, the value of cooperation, mutual confidence, and fair dealings with one another. Second: As workers, for an intelligent selection of and successful progress in their vocations. Third: As consumers, for judging the products of industry.

Subject Matter and Method.

It would be an impossible task and result in a mere jumble of facts to attempt to cover all fields of industry, therefore this course should be confined to a very few major topics, but with no limit as to the number of materials or processes involved as the study progresses. From the standpoint of function, a few typical industries might be selected, as: Building and construction, machinery manufacturing, conveyance manufacturing—automobile, railroad, boat, and air—printing and publishing, and the electrical industries. Or from the standpoint of materials used, such a list as: Woodworking industries, metal working industries, leather working industries, rubber industries, textile industries, and cement industries. The next step might be a survey of the local community for a selection of real industrial firms for use as a basis of study in the school classes. They should be local firms of such a character that they may be studied first-hand, be as

typical and covering as great a part of the field as possible, and of such a character that much data and information is readily available. A preliminary survey of quite a number may need to be made to select a few of the right kind. It is likely that two or three firms will be necessary to adequately cover the field, as in the woodworking industry, for example, a saw-mill, a sash and door mill, a furniture manufacturing company or store, and a contracting company all may be needed. There are also the common aspects of most industries which may be studied, as: Wages, hours, and conditions of employment, history or development of the industry, raw materials used in the industry, processes, and products, and their disposal. The above may be used in two ways: First, in treating each industry separately, these topics may be used as a basis for study of each industry. Second, in treating all the industries as a whole, these phases may be studied as common to all.

Two starting points for the study of industry have been suggested in my reading: First, using certain specific local firms as the introduction—a well organized visit to some plant, preceded by some preparatory class work. Second, using some shopwork on various articles as the introduction to the study of the industry, as: Work with bells, buzzers, motors, vacuum cleaners, etc., as an introduction to a visit and further study of the electrical industry. Work on windows and doors, framing, hanging of doors, fitting of locks, etc., preparatory to further study in house construction. The tearing down, assembling, and operation of an automobile preparatory to a visit and further study of the automobile industry. The last statements may sound ambitious in connection with upper grammar grade students—but the work mentioned does not correspond to what is commonly known as "auto-repair" or other technical courses given in senior high school shopwork. It is intended to be very elementary—from an understanding point of view—enough organized "fooling" with these machines to get the idea of their construction and principles of operation, and to serve as a point of departure for study of the industry.

The content material in this course should be presented by means of four major types of school activities: Classwork, readings, observations, and shopwork. The order in which each comes in covering given ground varies, as does also the stress upon each form, with the type of work taken up, the subject, etc. The point is to use that which is best suited to the topic under consideration.

A point to be stressed thruout the four forms of carrying on the work is that of making it of such a degree of difficulty that all pupils, even the more backward ones, may feel that they are accomplishing—this thrill of accomplishment will go a long way toward keeping them working with all their energies.

Another point is the matter of correlation. There are two sides to this—ours and the academic teacher's. Ours, when we go to the teachers of other subjects that their classwork aid or make more clear or interesting some part of our work. Theirs, when they come to us that our work may aid in vitalizing topics in their studies. For the enrichment of the students' work as a whole, this brings out clearly the necessity of there being in the faculty a spirit of cooperation and mutual helpfulness. The teacher, then, of industrial education should feel free to seek the aid of various other studies for the better carrying on of his own work, and at the same time, be always ready and willing to bring his study to the aid of others. Below are given a few brief suggestions relative to the ways many of the other subjects of the curriculum may contribute to the interest and the enrichment of this one:

Printing, especially if there is a school paper, may help thru the publication of various articles or items of interest on industrial topics, or reports which the students have worked up. The printing department may prepare for shop use direction sheets, blanks, and forms. And it will give the students actual shop experience in one of the world's greatest industries. The graphic arts may aid in designing and the making of drawings. History and geography may be called upon in locating and showing the development of industries, their leaders, raw materials, products, and factors entering into the transportation and marketing of them. English, thru oral and written reports, may aid in the correct and most effective expression of ideas. The relation with science is so close, that I believe a large part of its content and material should be taken bodily over to industrial arts, or the teachers of each may be considered as in one department, and work in close correlation. Undoubtedly there are other subjects not mentioned here which may contribute in many ways. I know that correlation to be done effectively is difficult and requires a great amount of work and cooperation. It must be a natural rather than an artificial correlation for the sake of correlation. It must be well organized, clear, and definite to both correlator and "correlatee." And it must be planned so as to come at the right time for work in both classes.

The Classwork.

Ordinarily classwork should constitute a large part of the activities in this type of manual training—certainly as much of the time should be devoted to it as in the science classes today. If possible, seats for recitation, study, drawing, and figuring should be provided in the shoprooms. A shop library, in addition to industrial reading material on the shelves of the regular school library, should be stocked with books, and magazines of an industrial, mechanical, and scientific nature. A shop museum may be developed—models, charts, forms of construction, mechanical and electrical devices, materials, and models illustrating processes may form some of its contents.

There are three forms of work which may occupy the class time—discussion, reports, and demonstrations.

Discussions: For each there should be a definite purpose known to all members of the class. The students should be encouraged to hunt pertinent, reliable information to present to the class at these meetings.

Reports: These may form the bases of the class discussions, or as suggested above, for publication in the school paper, or for work in the English and other classes. They may be both oral and written. Individuals might make special studies, investigations, or experiments to gather material and interesting information for presentation to the class. However, there are several cautions in this connection: First, the work must be simple, and with material easily available. Second, they must be planned and organized so as to get results and get them rather quickly. Third, they must be directly tied up with the work under consideration by the class, and of interest to the boys undertaking them. A few of the many topics which would lend themselves readily to this work are suggested below:

Various metals as conductors of electricity, considering cost as well as efficiency.

Merits of the electric propulsion of ships.

Concrete ships and railway cars.

Stains, and their penetration.

The collection, classification, and mounting of tools, models of processes, and various materials used in construction.

Demonstrations: There are three forms of demonstrations: those given by various pupils as part of the report on the topic of which they have made a special study; those given by the teacher covering tools, activities, and processes which the pupils are about to undertake; and those given by the teacher on tools, processes, etc., which are beyond the students' ability, but which are considered valuable for the understanding of a given topic.

Reading and Books.

There should be plenty of reading, but it should be varied and the bulk in easy narrative style—industrial fiction, literature, stories of inventions, geographical and historical stories, biography, and travel stories relating to the industries and activities of man. Some may be carried on as an informal type of voluntary reading at spare moments when the boy has finished a process and must wait until the group is ready to go on. For this the instructor places industrial, mechanical, and scientific magazines and interesting books of the same nature at some convenient place in the room. There may be marked passages for them to note especially.

Then there is systematic reading which can be carried on relative to reference work, industrial fiction, textbooks, and job sheets.

Reference work: As in the reports mentioned above, the references must be very easy of access, and the whole character of the work rather simple—the aim being not an advanced piece of work, but rather the formation of a habit of using reference material and of an appreciation of its value. As a beginning, each boy might look up something definite on a given topic in one book, and bring the statement of that author to class as a contribution to the solution of the topic under discussion.

Industrial fiction: As suggested above there should be an abundance of this material. It should be as varied as possible, and it should be for the purpose of getting the students to enter through their imagination, into the various experiences of the world of industry. There is not a great amount of this material readily available in good form—some examples of books, from a list loaned by Professor Emery T. Filbey are: "With Men Who Do Things" and "Pick, Shovel, and Pluck" by Bond, "Out of Gloucester" by Connolley, "Cinders—The Young Apprentice of the Steel Mills" by Weir, "The Log of a Timber Cruiser" by Lawson, and "The Day's Work" by Kipling.

Textbooks: As long as there are none comprehensive enough to include a large volume of easy reading material of the above character in addition to more formal and technical material, many educators believe that the use of textbooks in this sort of work should be rather limited. They give common ground to be covered by the whole class, they relieve the teacher of going into great detail on minor matters, and if they form but a small part of the reading, their use is recommended.

Job Sheets: These might contain directions, suggestions, and questions, and be used supplemental to the work of the teacher.

Observational Excursions.

Observational excursions should be well planned and worked out ahead to care for all students all of the time to and from, and while at the plant being observed. Some reading, shopwork, and class planning might precede the excursions to get into the spirit of the industry, and that the students might better note significant points observed. The work should not end with the excursion, but class discussion, reports and generalizations follow. It has been suggested that the students take some part in the activities observed thus making them more real. Tho this would be impossible in some plants and types of work, and would involve great preparation, yet it certainly would be worth a great amount of extra effort in the boys gaining a real understanding and appreciation of the industry. Instead of a "dressed-up" affair where the students only look on the activities of the workmen, if they could come in their jumpers and take a hand, it is certain that some progress would be made toward the social ends desired in this sort of study.

Group excursions to plants and for the observation of construction going on in the neighborhood may be supplemented by individuals of the class doing other visiting and giving to the class a report of the activities observed. The group excursions may cover not only plants in operation but the study of the products of

industry as well—for instance: shoes, furniture, mill products, rubber products, motors, electrical appliances, etc. These need not be brought to the school shop, but may be profitably studied in their natural and functional surroundings. Their design in relation to surroundings and use, their efficiency, construction, principle of operation, and economic value are some of the points to be noted about each. Both the good and the bad should be observed, and the points contributing to one or the other noted.

The Shopwork.

"Life must be lived to be known." The activities of the children in the shop form an important part of this course. What has been tried to be avoided is making the shopwork—technical activities and skills, the making of articles, etc., rather than the development of a general knowledge concerning industry, the basis of the course.

Individual projects are not to be done away with --on the contrary they furnish the means of reaching the fundamental interests of the pupils. Still further, an effort should be made to get away from the adult point of view in the selection of what shall be made. Their study of the industries can be made real thru the construction of various apparatus, models, etc. These should appeal to them thru their play instinct, and as representing the "real" grown-up worth-while things in actual use in real industry. Both of these appeals are seen to be legitimate when it is remembered that the major purpose of the course is not the production of useful articles from an adult viewpoint, but the development of knowledge and interest in the greatest activity of man—industry.

With this as its purpose, the introduction of labor-saving machinery, and "samplings" of the factory method of production, may form a part of the course. The use of labor-saving machinery, devices, jigs, etc., may serve educationally in several ways: Save a large amount of uneducative drudgery, be educative thru the planning and designing of them, and form a starting point and means of real appreciation in the study of such machines and devices in real industry. A little experience with the factory method of production will function in two ways—it will not only give them a general idea of the method but will also bring out the advantages of the method. They will see that it is based upon specialization wherein each must do his part in the whole, where good results cannot be obtained if one does not do his part well, and will show the value of cooperation—of submerging oneself as member of one of a number of cooperating groups. They will see the economy of time and materials, and the greater and better production due to the increase of skill as one repeats a process many times. The students may select a design which is adaptable to factory production, they may pick out the processes, steps, and tools in the making, and organize and route the work. When formed into groups to do this work, the groups may work at a number of the processes, thus gaining a general idea of the whole.

This paper is an effort to suggest a type of shopwork which will be of greatest value to a school located in a moderately well-to-do community. No attempt has been made to fully outline the work to be carried on, and it is realized that the material here presented is very fragmentary and perhaps of litttle direct value. No credit can be taken for any original thinking along the lines suggested by this paper, for it is felt to be but one expression of a general movement which is based on the conviction that the industries have a place in the curriculum, not only as a part of directly vocational education, but also as an important part of the general education of children, that this work, whether known as manual training, industrial arts, or by other names should not be dominated by any of the other subjects of the school, and that like the other studies, it is susceptible of scientific organization and measurement.

MAN must work—that is inevitable. But he may work grudgingly, or he may work gratefully; he may work as a man, or he may work as a slave. He cannot always choose his work, but he can go about it in a cheerful, generous temper, and with an uplooking heart. There is no work so rude that he may not exalt it; there is no work so dull that he may not enliven it.

Adding Interest to Practical Problems in Shopwork

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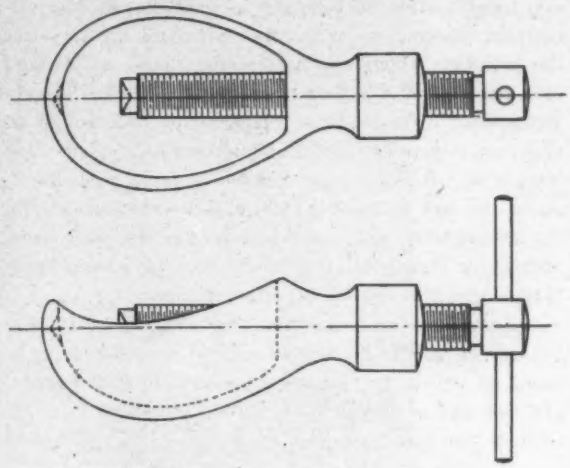
IN LIVING up to the demands of recent editorials in the Industrial Arts Magazine concerning interesting and practical projects in shopwork, it is very hard to find problems of unusual interest and great usefulness. But it is necessary in the endeavor to maintain enthusiasm and intense interest in shopwork to find new problems and introduce them into the course of work. Teachers of experience realize that shopwork must have a definite content of subject matter. True, with different teachers, in different localities the content of subject matter may vary slightly, but the variance is rather in the method of teaching than in the content of the subject itself.

No one can dispute the statement that shopwork has a large content of subject matter. Each division has its own and separate subject matter. The content of subject matter in a course in benchwork is as definite as the content of a course in history or plane geometry. A course in shopwork with no definite organization of the subject matter would be as bad as a course in plane geometry with no sequence of problems. Think of starting a course in plane geometry with a consideration of triangles. It would be as easy to do this as to start a benchwork class with an exercise mortise and tenon joint. The sequence of tool processes can be as definitely organized as the sequence and interdependence of problems in geometry.

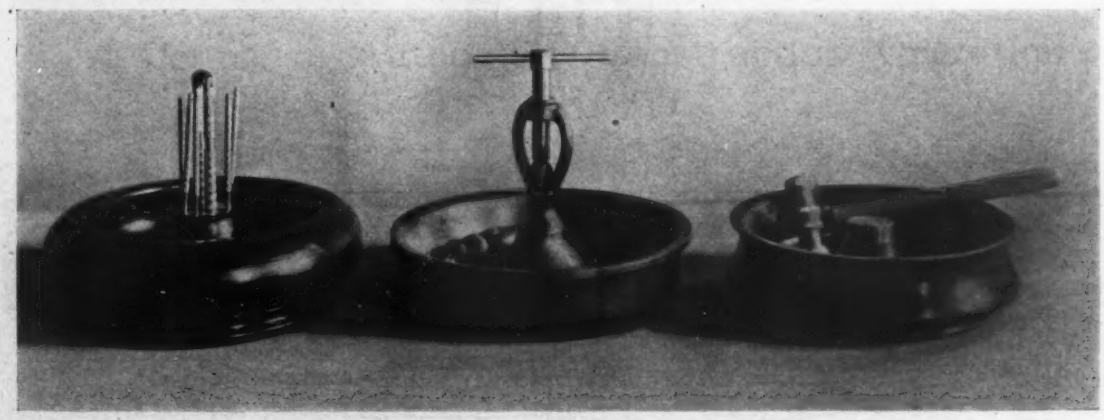
Shop process analysis is the last word in modern methods of manufacture. This can be applied to any course in shopwork in schools. A course in carpentry must teach methods employed by carpenters out in the actual business of building houses. The methods used by carpenters on the job are the result of years of job analysis and good carpenters usually do any given job alike. In the same way teachers in various parts of the country working on the same problem of organization of subject matter and courses of study in benchwork, reach almost identical conclusions as to what should be included in the course of study.



WORKING DRAWING OF NUT CRACKER.

Appeal to interest is necessary. New enthusiasm must be obtained yearly. But interest and enthusiasm are not enough to justify the placing of shopwork in schools. If there is no definite amount of information to be given to a student in a given term of shopwork it does not justify itself. A course in history where the student is allowed to read at random, to browse at will over the entire field of history would not meet the requirements of modern educational methods. Yet many school shop teachers allow the students to do that very thing, to browse at random over the subject matter of shopwork.

Now it can be definitely stated that a given term of shopwork without a definite content of subject matter thoroly covered by lecture and application cannot be successful teaching, judged by standards which govern other school subjects. It can also be said without fear of successful contradiction, that a course of study of any sort with no definite subject matter is not worthy of a place in the school systems.



NUT BOWLS AND NUT CRACKER.

But any form of shopwork has its own definite subject matter and when it has been organized with a proper regard for sequence of trade operations and with due consideration of pedagogical sequence of shop operations, it remains for the individual teacher to select the problems which will fit into the course as planned and also obtain a sufficient interest to make the subject appeal to the students. It is in the endeavor to do this that so many unique and interesting problems have been tried. But it is seen that few of these experiments stand the test of time. Yet these observations should not be construed as an adverse criticism of these experiments, for nearly all new discoveries in science come from a great amount of experimentation.

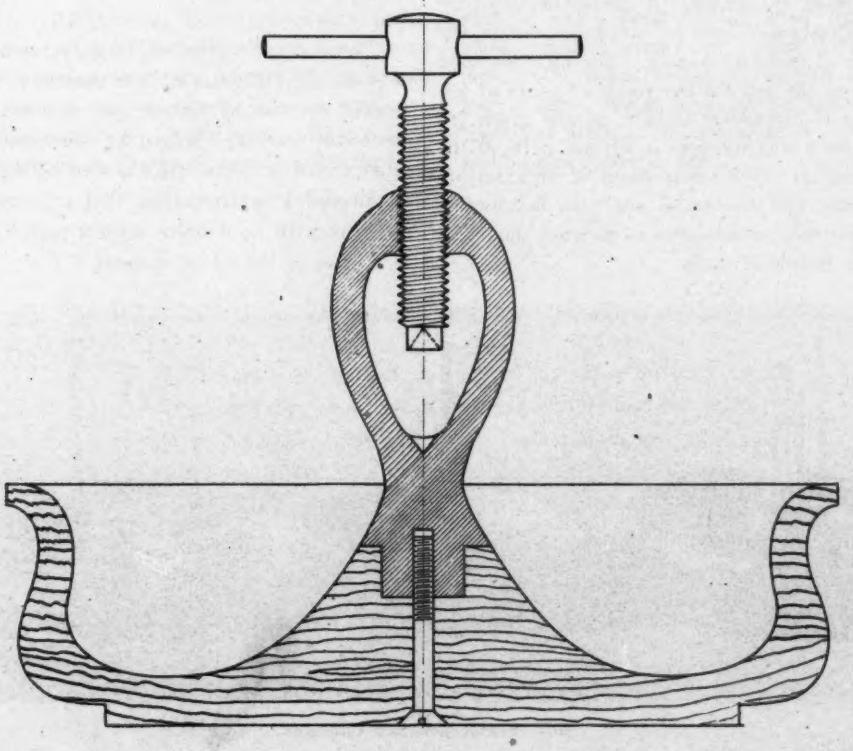
Just as design is based on the two aims, utility and beauty, so might the present aim of shop teaching be based on two principles, usefulness of finished product and amount of information gained by individual student in producing finished product.

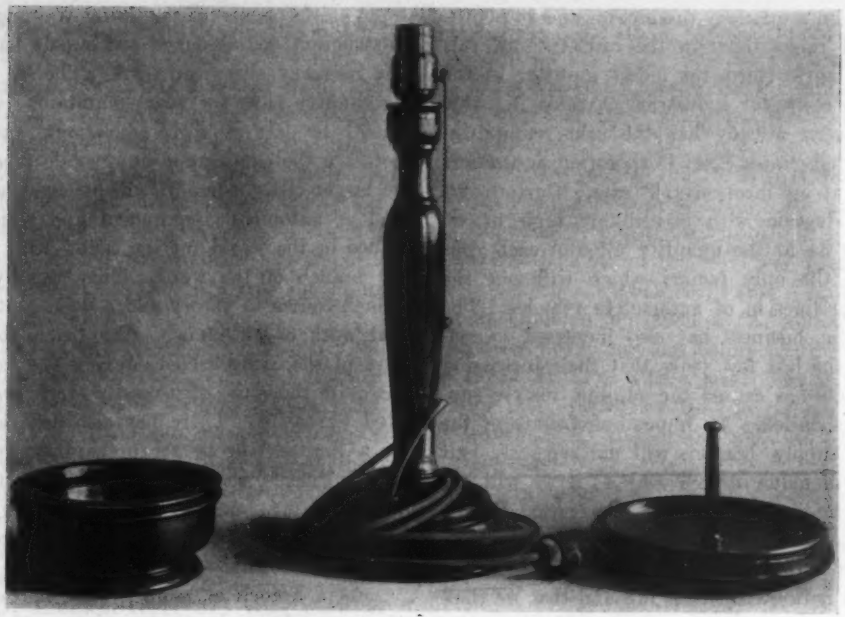
With those definite aims in mind the problem of the nut bowl, illustrated herewith, was developed in the shops of the Oklahoma A. & M. College during the past year. The pattern-making class of the spring semester of 1918-19 made patterns for the casting used in the nut cracker. The foundry class of the fall semester of the present term made castings, the machine shop students did the machine work as a part of production work in the trade course and the finished nut crackers are sold to woodwork students to set in nut bowls. About one hundred students take lathe work during the fall semester and nearly forty nut bowls were made for Christmas gifts. Several nut bowls with iron stakes were made and small hammers turned by machine shop students were sold to woodwork students who turned handles for them and used them as a part of the nut bowl equipment.

This problem will be of interest to many schools where the equipment includes a machine lathe. Patterns may be made by good woodwork students or the instructor if no course in pattern making is given. A barrel of moulding sand and one flask, pattern and a forge fire are all that is necessary to make castings from aluminum. We procured aluminum from the junk yard and made most of our castings after school hours, melting the aluminum over a forge fire. Quite a number of the castings were made of cast iron in the foundry. All of the machining is done with a small drill press and a lathe.

In the wood turning, it is necessary to consider the problem of getting stock for the bowls, all of which were made approximately three inches deep and ten inches in diameter. It is almost impossible to find 3″x10″ lumber which will stand kiln drying without checking. Sometimes we have found a piece of 3″ stock which has air seasoned for a number of years which will do to make a bowl this size. So we buy one inch stock thoroly kiln dried, usually cedar or oak, glue eleven pieces 1″x3″x10″ together flatwise, heating the lumber and using hot glue, thus getting stock with dry lumber all the way thru. We have not been able to glue flat stock, i. e., three pieces 1″x10″x10″ together with much success on account of resulting strains due to warping

·DETAILS·OF·NUT·BOWL·WITH·NUT·CRACKER·





TURNED WORK PRODUCED IN THE SHOPS OF THE OKLAHOMA A. & M. COLLEGE.

or shrinking of these pieces. The scarcity of 10″ width stock also is a hindrance to this method.

In the turning of the bowl, it is best to screw the face plate solidly to the bottom of the bowl, turn and finish, fill screw holes with sealing wax and glue felt over bottom. It has been found that a few words of caution are necessary as safety first principles. First, do not at any time run the bowl over six to eight hundred r. p. m. The bowl might fly to pieces or a tool might get caught in the work. Second, when working on the bowl, do not stand directly in front of the bowl as it might even at moderate speed fly to pieces. Do not allow any bystander to stand in line with work. Third, use only skew chisel and round nose for shaping bowl. The gouge should not be used in face plate work. Only a scraping cut can be used with safety.

We have found that the best method of finishing the bowl is to oil the stock with a mixture of half and half linseed oil and turpentine, apply two coats of shellac with brush, on lathe, allowing 24 hours to dry between coats, sanding lightly after each coat has dried and finishing with two coats floor wax. Apply wax freely, allow fifteen minutes to dry and polish lightly with wool rag while lathe runs at moderate speed.

The hand nut cracker illustrated is similar to the nut cracker used in the nut bowl. It forms a machine shop problem of great interest. It is difficult to find a lathe exercise which can be used in some finished article and this is especially hard in the beginning of the machine shop course. The spindle of this problem makes a fine early problem in the machine shop courses.

We require trades-course boys to make ten of them, others make two. The castings may be made in aluminum or brass and form an interesting example of mouldboard moulding. We have made about fifty of these and have spindles for another hundred. We have not tried to sell any of them but similar ones in local stores sold for fifty cents last Christmas. The drilling and tapping of the casting give an application of lectures on use of drills and taps. The fact that we are in the pecan district makes this problem very attractive to the boys who work in the shops here.

A Course in Automobile Construction, Operation and Repair

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A LITLLE more than a score of years ago, every one experienced the thrill of seeing a socalled horseless carriage. It furnished the main topic of conversation for days. Now you can drive across any one of several States without seeing many horse drawn buggies or carriages. Such has been the magical growth of the motor vehicle industry. Perhaps a few figures might emphasize this. In 1900 about 10,000 motor vehicles were produced, 48,000 in 1906; 72,000 in 1907, and so on until the beginning of 1920, there were approximately 6,500,000 passenger cars on the road and the predication of good authority is that by the end of 1925 this figure will be increased to 15,000,000. What other industry has been so prolific? Even today, after a little over twenty years as a distinct industry and only

about ten years on a quantity production and standardization basis, it ranks third in the industries of this country. Only agriculture, the oldest industry in the world, and the electrical industries outrank it. One automobile concern already has the same capitalization as the United States Steel Corporation and others are expanding at an inconceivable rate. Curtailment of gasoline production with exceedingly high prices, also limitations as to the quantity allowed each consumer, will be the only factors which will put the brakes on the production of automotive vehicles. The truck and tractor business has also increased so materially within the last few years that their increasing field of usefulness has caused the gasoline reserve supply to become curtailed. An impending failure of the petroleum fuel supply, howver, will not seriously halt the production of motor driven vehicles if we will but consider the statement by Gide, the great French economist, "When nature fails, man's ingenuity fails", meaning that man has always been able to furnish a substitute when natural resources fail and that we shall no doubt ride around in motor cars long after gasoline has been forgotten.

Undreamed of possibilities lie in wait for the youth who can get some training as preparation for entering this promising and attractive industry. The demand for men trained for the motor trades has always been several laps ahead of the supply. This condition will always continue because of the great expansion of the business yet to come. Furthermore automobile manufacturers and dealers are beginning to realize that they are not merely selling a car, truck or tractor; they are really selling service. This means that men engaged in the industry must be of a higher type, trained for high class, thoro work, demanding to a certain extent, a degree of specialization. The automobile industry in its various ramifications offers dozens of choices in the kind of work that can be followed. The manufacture of cars involves chief engineers, designers, chief draftsmen, layout men, detailers, tracers, checkers, factory superintendents, factory managers, foremen, machinists, tool makers, tool designers, die sinkers, production men, foundrymen, drop forge men, assemblers, testers, final test men, service department men, stock keepers, etc., without number. The sales and advertising end of a factory offers great opportunities for the men who understands the motor car and has the other qualifications necessary. For the young man who wishes to enter the commercial end there is the retail sales and distributing sales room. Other opportunities lie in every small country town and large city to operate tire sales and service stations and battery service stations. Other service stations which are profitable are wire wheel, bearing, starting and lighting, etc. Then there is the accessory store, both retail and the wholesale jobbing house. This is just the briefest kind of outline to show the myriad number of opportunities awaiting the young man who turns in the direction of the automotive industry.

Various means of obtaining training in motor-car construction, maintenance and repair have been available in many cities for years. The Y. M. C. A's. of the country have for years maintained day and night schools as part of their educational program. Then there are the commercial automobile schools located in the larger cities, some of which have every conceivable kind of automobile equipment and which offer every chance in the world for the fellow who wants to learn any branch of the work. They usually give a well-defined course in theory and a wide contact with practical work of all kinds. Many men obtained a good start in the army schools during the war. The work was quite thoro tho of necessity much had to be assimilated hurriedly. There has also been an opportunity for a limited few to get preparation in some of the factory schools, showing that the factories realize that if trained men are to be available they must prepare a number of men each year to be assured of a source of competent help.

As a branch of public vocational schools, courses in automobile mechanics have been added but recently. Far-sighted public school systems realizing the tremendous growth of the industry and the opportunities afforded, have added courses and provided equipment to make such instruction possible.

The argument for automobile instruction, as a means of conforming to community activities, does not need to be discussed. It is too obvious. A course in automotive theory and practice cannot be expected to turn out finished mechanics, service men or men with the complete fund of knowledge and experience necessary to hold a high class position any more than a law school can be expected to turn out finished lawyers. They must gain further experience in the field. However it can give them a thoro grounding in fundamentals so that they have a foundation which, coupled with a few years of experience, will round them out into thoroly capable men. The instruction offered should, therefore, aim to include mainly fundamental principles as the foundation on which to build the superstructure—experience.

To prepare boys as automobile mechanics should not be entirely the ultimate goal of such training. There will be found in a class many aggressive young fellows who would aim higher and whose ambition could be aroused to higher things, if the opportunities were pictured to them. In other words such a course should portray the large field of opportunity for gainful employment in the higher class of work. A few instances from the author's previous classes may illustrate. One boy who seemed to be a hustler evidently took interest in some remarks made in class about salesmanship. Within a week he reported that he had sold a Buick Four for an acquaintance and made $50. He would hear of a car and would find out how much the owner wanted. Then he would find a buyer at a price which allowed him a little for his work. He reported a sale

occasionally and had a comfortable checking account to his credit. Surely it is valuable training for the future. Again a few casual remarks about the automobile business in a night school class brought two fellows into automobile sales work, one who had started as a mechanic in the local Packard service station. He kept at the manager to let him sell trucks. He was given a chance and in two weeks sold eight trucks. All these men needed was to have the opportunities pointed out to them. Surely a course should indicate the scope of opportunity.

Again such a course should inculcate a capacity for independent action. It should foster initiative for many school boys who are helpless. They must have everything done for them and enough problems should be given them from time to time so that they have to settle some difficulties for themselves. They should above all, when given a definite job in the shop, be taught to take hold of the job and complete it, find a way out, then report that the job is finished so it can be inspected. Many of them will work on a job for a while and then forget about it, leaving it half finished. This is especially true of work left over from one day to the next, of work started in the morning and not completed when the lunch hour comes around. This is very important and should be watched closely. Some boys seem to never grasp the fact that they must finish a job and get ready for another. It will take much patience on the instructor's part to carry the boys along until they can be depended on to work a thing out for themselves in a thoro, workmanlike manner.

Furthermore, the course should propose to teach the students orderly and correct procedure in garage and service station practice and routine. They should be taught to see that they must use their heads and not merely a wrench or cold chisel. There will be enough instances of down right "boneheadedness" brought out when any car overhaul is attempted. Unless the instructor has plenty of patience he will have need for a few pet invectives at times. Again the instructor must be constantly on the alert or a crank case oil pan will be put on without the oil gage float in place, bearings tightened up without any oil on them; a big monkey wrench used on a small screw with the result that the screw is sheared off, etc., etc.

The instructor of an automobile class must be an all-around man especially in the shop. In fact, he must be several men in one. First of all he must himself be thoroly versed in fundamentals and able to explain principles in simple, non-technical language. There is nothing about an automobile that cannot be reduced to the simplest possible terms provided an instructor will look around for a few simple illustrations. He does not have to arouse the interest of the class. All red blooded American boys are interested in automobiles; they know all the makes in common use, and as many of them have cars at home they will have a pretty intimate knowledge of the mechanical make-up of a car. It is merely "up to" the instructor to sustain their interest and enlarge on their previous knowledge. He must, therefore, present fundamental principles in such a way that they will grasp them and continue to be interested.

Above all he should have enthusiasm and "pep." No cooling system is needed for the instructor's enthusiasm. It will be chilled often enough by some bright member of the class who breaks a part or puts something together backwards. At the same time he must not do too much of the work himself but rather let the boys study out beforehand how they are to proceed. In fact, with a large class it will be impossible for the instructor to do much work personally, especially if there are several cars being overhauled at one time.

In order to have the work proceed expeditiously and systematically, the instructor should be enough of a disciplinarian to keep the work moving; otherwise the boys will become shiftless and not put forth their best efforts to get the job done. It really takes a martinet to keep the boys at it continuously. There is so much opportunity offered to "soldier" on a job especially with large classes and where the boys must work under cars. The classes, therefore, should be limited to sixteen or eighteen, at the most, to one instructor. When you consider the valuable material worked on it is readily seen that an instructor must be able to see what is going on all the time. The government realized this fact during the war and rarely had more than twelve men to one instructor. More often the men were in groups of eight. In the bulletins recently sent out by The Education and Recreation Branch, War Plans Division, War Department, for the guidance of the army vocational schools, it is directly specified that there should be one instructor to every ten men. The lecture work can be attended by larger classes but in the shop it is useless to attempt instructing large groups of inexperienced boys.

If fundamentals of automobile construction are the aim of such a course then the lecture period must form the backbone of the instruction. A short lecture period, say thirty minutes, should be attempted each day in a suitable demonstration amphitheatre, if possible, otherwise some provisions must be made for seating the students during this period. The outline for the course should be closely followed altho there will be times when the instructor will of necessity need to speak of or demonstrate some phase of the work going on in the shop. The lecture work should be conducted in an interesting manner, otherwise it may sometimes prove hard to sustain attention and interest in the work. Simple illustrations should be resorted to all thru the course. Every means should be used to make sure that the boys get the right concept thoroly.

A blackboard is a necessity and clear blackboard illustrations will do wonders in reaching the boys. However to avoid making the more essential, large-scale and

complicated diagrams, permanent charts can be drawn on wallboard with colored crayons. These charts will prove useful to refer to at all times, and the more charts on hand the more effective the work will prove. Working models of wood, actual parts, sectionalized motors and parts, etc., should be freely used. Remember the psychological fact that the more points of contact the stronger the impression and the greater the faculty for retention. As the instructor proceeds with the lecture and demonstration he should put a brief outline on the board.

This outline and other notes, diagrams, etc., should be copied by the boys in note books. An ordinary loose-leaf note book or composition book will serve for notes. Keeping a note book is an essential part of the work. If the note books are handed in occasionally, the instructor can observe the neatness and care displayed by the student, and gauge his general interest in the work. If note books are essential in high school and college subjects they can surely be used advantageously in an automobile course. The course of study and note book will serve to prevent the course from becoming too general, like some courses in general science. Following a course of study closely will result in a well-ordered, systematic study of the automobile, covering all points in their true relationship to each other.

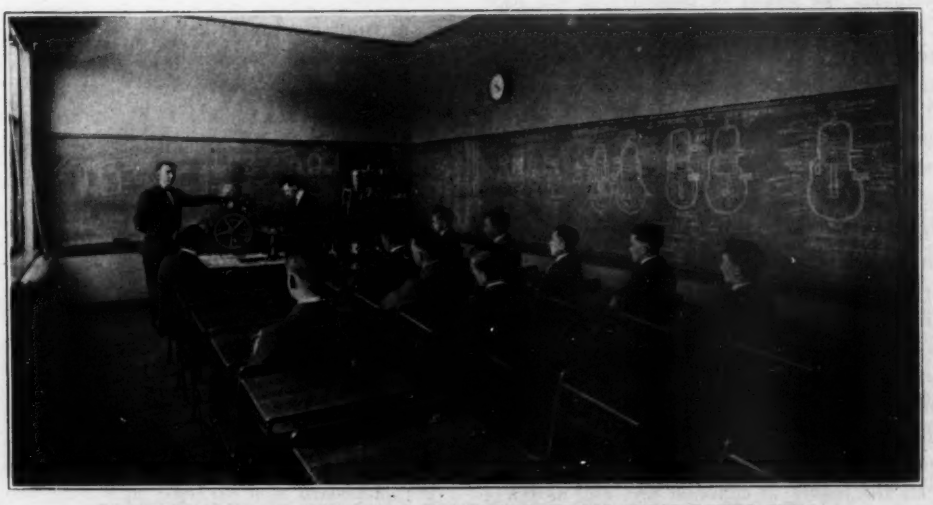
A further check on the student's progress and grasp of the subject can be obtained by means of frequent tests. The writing of a test paper makes a student prove that he thoroly understands the subject matter as presented in the lecture period. Another means of crystallizing the student's knowledge consists of assigning a topic to each student as a subject for a paper to be read in front of the class.

Almost every city of any size has an annual automobile show. The local automobile dealers' association will no doubt gladly cooperate with the school by granting free admission to the members of the class. This will be found doubly valuable in acquainting the boys with the latest changes and improvements. For instance, the shows this year brought out the fact that all manufacturers were trying to cope with the present-day lower grade of fuel by resorting to some means of preheating the charge. Here was a fundamental structural improvement forcibly shown. Excursions to various sales rooms and service stations always stimulate the interest and are valuable instruction aids. Every dealer realizes that the boys of today are the potential buyers of a few years to come. In fact one dealer of the author's acquaintance, who sells a popular light six, put his sales room on a certain street mainly because there was a million-dollar high school being erected a couple of blocks away and the students would pass his show window. The instructor need not hesitate about bringing a bunch of "kids" to a sales room. Only on one occasion has the author met with anything but the heartiest welcome.

Visual instruction can be utilized in this work to advantage. A Pathescope or a school moving picture machine will be found a valuable co-worker. The Bray Paramount pictures, "The Principle of the Gas Engine" and "The Principle of the Differential" are among the best educational films ever produced. Several of the automobile companies have films showing the production of a car from foundry and steel mill to the road. Among these are the Ford and Maxwell.

The value of visual instruction has been recognized in all branches of school work. If it is found difficult to obtain any films of this description the extension department of the State schools will no doubt gladly cooperate with any school desiring the same.

(To be continued.)



CLASS STUDYING ENGINES, GRANT VOCATIONAL SCHOOL, CEDAR RAPIDS, IOWA.

Note Models, Sectionalised Engines, etc.

SHOVELING DIRT AS AN EDUCATIONAL PROJECT

W. P. Beard, Teacher of Agriculture, High School, Brookings, S. D.

The work in vocational agriculture under the Smith-Hughes law requires farm shop instruction. The manual training shop was already filled so other quarters had to be found in which to carry on this new line. A large basement room, which had served the purpose of a dumping ground for the school, offered the solution to the problem. Of course it needed a lot of alteration, but it had possibilities.

The proposition was put before the boys and suggestions asked as to what they thought was needed to make it a suitable shop. Plastered walls, a tight ceiling, more light, a concrete floor, and a higher ceiling or a lower floor were considered as needed. The last mentioned improvement being most needed was considered first.

The class was planning on doing the concrete work as a project but the unavailability of labor for excavating brought forth the suggestion that the boys also take that as a class project. The question arose whether the work should be done in school time or on Saturdays. Along with this came the question of paying the boys. It was finally decided to let the class do it on the contract basis.

When the proposition was first put before the boys many of them preferred to work by the hour. But after further explanation of contract methods and advantages they agreed to do it on the latter basis. They decided to do the excavating on Saturdays.

Of course they were anxious to know what they should be paid for the work and so were ready to figure on and plan the project. The class time was used for making all plans and figuring on costs. The discussion was led by the instructor, but in many cases it had to be suppressed owing to enthusiasm. The great majority of the questions was brought up by the boys. Speaking of relating our school work to things in everyday life, the connection was very evident in this discussion. They drew heavily from their experience in supporting their ideas as to how things should be done.

Following is the outline developed and used in the discussion. What will be our bid on excavating the basement and hauling away the dirt?

1. Just how shall we go about the work?
   - (a) To what extent can horses be used?
   - (b) Will it be necessary to build any chutes or approaches?
   - (c) In what part shall we start?
   - (d) How shall the workers be distributed?
   - (e) Shall we throw the ground out of windows or shall we take it out thru the door by some means?
2. What equipment will be needed?
   - (a) Where can we get these things?
   - (b) On what terms can it be gotten?
   - (c) What can each one of us furnish?
3. How much shall we figure our time worth?
   - (a) What wages are being paid now for this work?
   - (b) Shall all be paid the same regardless of kind of work done?
   - (c) How shall one's share be determined?
   - (d) What shall those who furnish teams receive?
4. How long will it take to do the work?
   - (a) How much dirt must be taken out?
     - (1) How many cubic yards?
   - (b) What is the nature of the soil in the basement?
5. What will it cost to haul the ground away?
   - (a) How many loads can be hauled by three men, a team and two wagons in a day?
   - (b) How much do the dump wagons hold?
   - (c) How far shall we be required to haul it?
   - (d) Can we sell the dirt and for how much?
6. How can we tell when we have taken out the right amount?
   - (a) What method was used by the paving contractor during the summer?

This outline does not show the details into which we went in considering the project. While discussing a question we often found that its answer depended on that of several others. Again it was found that some of the questions given equal importance in the outline were interdependent.

Briefly it worked out something like this: We shall take the first question for example. All were agreed that the more horse labor we could use the cheaper the work could be done. On looking over the basement entrance it was decided that a horse could not be gotten thru it. The use of horses was nearly laid aside when one of the boys suggested their use on the outside, hitching to the scraper by means of a cable or chain. This method was adopted and worked well. That brought out a discussion of close and long hitching. Next some one asked how the dirt was to be gotten out of the corners by this method. It was suggested we might run the scraper up thru the windows by building approaches on the inside to make the use of the scraper more general. This was thought impractical and it was finally decided to use wheelbarrows to move the dirt from the corners to the path of the scraper which would then carry it out thru the doorway.

The general method being decided upon, we took up the question of what equipment would be needed. All agreed on shovels. How many and what kind brought out some differences of opinion. Many pre-

ferred long handle shovels! The practicability of a plow was considered and was secured in case it would be necessary. A final list of equipment was made out and secured. It contained shovels, picks, wheelbarrows, scraper, plow, cable and chain, level, teams and wagons. Tools were available in the shop. It was decided that it would be possible to get much of the equipment from contractors and that they could furnish some themselves. The contractors we found were not at all averse to letting us use their equipment.

This type of problem certainly seems to fill the requirements of modern education. It was motivated to a great extent. The boys were receiving money for their work, both mental and muscular. They were also to be benefited by having a better place in which to do their shopwork. The study was made by what is known as the project method of approach and also as supervised study.

It was closely correlated with daily life. Most of the boys intend to be farmers and will at some time find it necessary to figure and plan on some similar project. This correlation was further evidenced in their use of experience in working out their plans. A striking example was given of this in determining the level of the floor after excavation. A few had worked on a paving job during the summer and one of these told the class how we could use a level, stakes and a straight piece of lumber to do this.

It taught them the advantages of thinking thru a problem and also how to think thru a problem. Some thought the only requirements for the job, before we started discussing it was a strong back. These changed their minds. Several needed help when it came to measuring the area and figuring the number of cubic yards, in spite of the simplicity of the problem. They had not learned to apply their knowledge.

They were impressed with the necessity of being ready to solve the unexpected difficulties. For example, a double-tree was broken. A new one was made. The trips on the dump wagons gave some trouble, a lot of force was used but a thoro study of the trouble showed that a little reason could have a lot of hard work. Heavy mud made it necessary toward the last to use four horses on a wagon. It was found that one team worked better on the tongue than as a lead team. A chain we were using on the scraper broke and was repaired in various ways till one boy finally settled it by the use of a short bolt, nut and washers. Many other things could be mentioned along the same line.

Another outstanding feature of the project was the attitude the boys took toward each other and the work. In the planning they found that some other's ideas were pretty good too. They were left to decide just how hard and fast they should work. Needless to say no one got more than his share of rest without being amply informed of the fact. They worked well, ate well, and got much more out of it than their pay, which, by the way, proved their ability to plan and manage.

We would suggest that it would have been better to carry this on in school time with no pay and as a school project purely. Otherwise there is a tendency to lead the boys to think they should receive pay for other work, such as concrete work, which is a benefit to the school. Other than this feature of pay the project was a success in all ways.

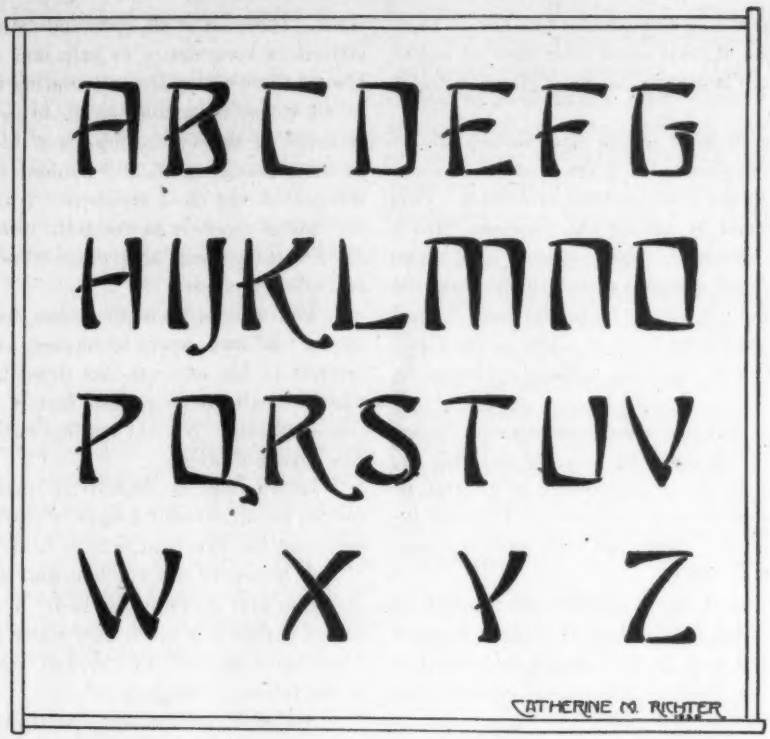
A DECORATIVE ALPHABET

Mrs. Catherine M. Richter, Drake University, Des Moines, Ia.

FOR certain purposes it is desirable to have a type which is graceful, without being too slender, such as for titles, initial letters, illuminated verse and lettering which is to be part of a design. The alphabet in this instance was evolved for use in an annual. I needed one that was very individual, legible, and simple in appearance, yet decorative—somewhat Japanese in character. Failing to find anything but the most elaborate Japanese type, unreadable and lacking in its national simplicity, I designed the letters for the title; and later, as its possibilities were manifested, I worked out all my lettering on that as a foundation.

The laws governing this alphabet are easy to follow, and have but few exceptions. Where there is just one vertical bar, as in L. T., etc., that bar is narrow at the top and widens toward the base. The only exception is J, which is wider at the top and narrows toward the base. Then where there are two bars, as in H, U, etc., the left hand bar follows this first rule, while the

DESIGN FOR SCHOOL ANNUAL.



1234567890

AN ALPHABET ADAPTED FROM THE JAPANESE.

right hand bar is the reverse, being heavy at top and slender toward the base. No exceptions. Most letters are rather angular—that is, instead of O being constructed of curves, it is evolved from these vertical and horizontal bars. Cross bars at the top are narrow at left and widen toward right, as in C, D, E, F, G, T, etc. Z is the only exception. Middle cross bars follow the same rule. No portion of any letter is of even thickness, but rather is graduated in width.

Lettering, using this type, is much more pleasing in black letters than in outline; the latter method loses simplicity, its most pleasing characteristic. The combination of the letters into words produces many decorative and most interesting combinations.

The accompanying illustration is a drawing used for the Drake University Annual.

INDUSTRIAL MATHEMATICS

**Charles H. Sampson, University Extension Department,
Massachusetts Board of Education, Boston**

THE industrial mathematics class is somewhat of a problem. To make it a success, certain definite factors must be given serious consideration—factors which do not necessarily act as obstacles to success in the usual preparatory mathematics classes.

It seems to me that the principal elements in this problem are:

The class members
The teacher
The course content
The recitation
The lesson assignment
The course duration.

May I discuss each of these in some detail?

The Class Members.

The members of the class should be selected with considerable care. The selection should be based upon quality rather than quantity. There should be some definite requirements for admission. It is an excellent plan to first hold an organization meeting. At this time selection should be made and actual enrollment take place. But enrollment should not be permited until the instructor has interviewed the prospective entrant.

It has been my experience that too many men are too confident of their ability to handle the fundamental

mathematical operations in a satisfactory manner. They forget that the lapse of time since their days in school has been so great. They have become "rusty" without knowing it.

Entrance to active work in the class should not be permitted until the applicant has given evidence of some knowledge of elementary mathematical principles. This fact is not determined by asking the question, "Have you completed a grammar school course?" or some similar question. That question is invariably answered in the affirmative and yet twenty years may have elapsed since our man-grown student sat as a boy in the classroom. An actual test (not too difficult) should be given.

Failure to pass this test should not necessarily bar the ones who fail from entrance to class but this organization meeting should be far enough in advance of the openings in class session so that some preliminary instruction can be given. Then all can start the race with some degree of equality.

Only men engaged in practical work should be chosen. This is a class for the benefit of men engaged in industrial pursuits and its field should be limited to those engaged in the trades. There are other classes for those having other aims in view.

And it seems to me that the slogan, *"We Want Completions,"* can well be adopted by those back of any proposition of this sort. The class members should have this impressed upon them at the start and this spirit should be with them thruout the course.

The Teacher.

Any mathematics teacher will not do. The industrial mathematics teacher must be a real teacher. No "bluff" will work in a class of this sort. He must not only know the subject which he is teaching, but he must understand its practical application. The teacher should be a man who has had at least some practical experience.

A teacher must be selected who can get down to the level of the men whom he is teaching. The great trouble seems to be that most instructors talk "over the heads" of their pupils. The successful teacher in a class of this type must open and close his class with a smile. He must at all times indicate both by speech and attitude a keen desire to help and a cordial sympathy toward those whom he is attempting to help. He should, at all times, be willing to go to some personal inconvenience to satisfy the desires of his class. If he will do these things, much will be done towards holding the interest of the class members. And it is difficult for the best of teachers to maintain interest in a class held after working hours and composed of tired men unless a real effort is made.

The industrial mathematics teacher cannot "loaf on the job" and expect to succeed. His personality, his interest in his students, his presentation of the course material—all are important factors in making for success or failure. No real teacher wants to fail.

The Course Content.

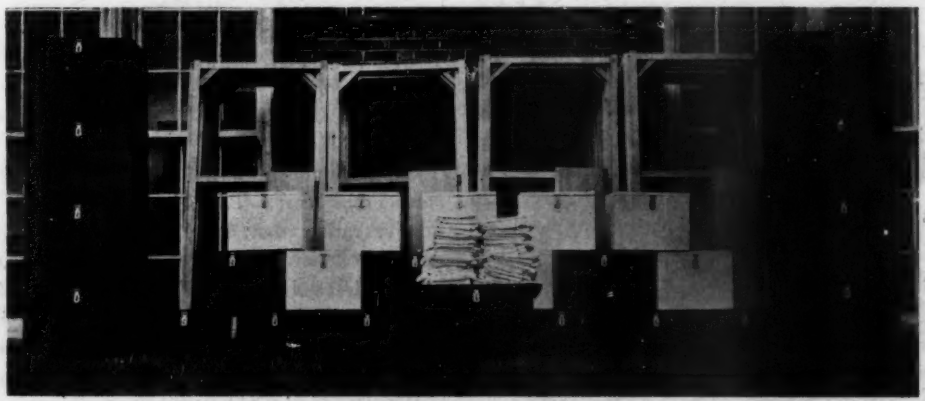
Instruction in industrial mathematics may, of course, be offered over a term of years. Shall we assume here that the first year only is being considered?

A review of the fundamental operations is always desirable and generally needed. The majority of men do not realize how much they really do need this review. The course content for the first year may well consist of the following subjects.

Addition, subtraction, multiplication and division particularly as applied to common fractions and decimals.

Percentage
Simple equations.
Ratio and proportion
Powers and roots of numbers
Solution of simple formulae
Graphs
Practical plane geometry
Geometrical constructions
Practical solid geometry
Logarithms
The metric system.

Of course, all of these subjects are familiar and might well represent the content of a course in high school mathematics instead of industrial mathematics. But these subjects are general ones. The important ele-



BALLOT BOXES MADE IN THE MANUAL TRAINING DEPARTMENT, SHELBYVILLE, IND.
ROY RAY, Director.

ment to consider is the problem selection under each subject.

To make this selection properly the needs of the class must be known. If composed of electricians, electrical problems should be selected; if the class membership is largely from the machine shop, machine shop problems should be discussed and solved. But the *process* must be the main thing in mind and its application must be made clear by means of clear explanation and proper problem selection.

The instructor owes it to himself and his class to devote much time and thought to course content.

The Recitation.

Too much formality will "queer" the recitation in the industrial mathematics class. I do not mean by this that the class is to be conducted in a slip-shod manner. It should be conducted in a very definite manner, in fact. The recitation should start and stop at a fixed time and no impression should be created that any other program is to be tolerated. I particularly refer to the personal relations between the instructor and the individuals seated before him and also the conduct of the recitation itself.

In the first place it is assumed without any question whatever that no attention to keeping order is necessary. "Here we are boys, on common ground." Just a get-together meeting for the discussion of these things of common interest." It seems to me that this is the attitude to promote—Why—I get as much fun teaching a class in industrial mathematics as I do going to a pleasant social affair. The instructor must cultivate this phase of the recitation if he is to succeed.

I believe that the recitation should be divided into three periods not separated by too distinct lines. First, problems in the previous lesson not understood should be cleared up. This leaves a "clean slate" to date. Second, instruction on the present lesson with ample opportunity for asking questions. Third, an informal discussion of something a little different from the subject of the lesson but allied to it. A short lecture perhaps, on something new taken from a late issue of a good technical magazine. This leaves a "good taste" for the class members to take away with them.

The Lesson Assignment.

Make lesson assignments carefully. Do not do so hastily and only after considerable thought. The tendency is to make them too long, but these men are busy, not used to night study and tired when they have to study. Select problems for home solution which will bring out the desired knowledge. That is enough. "Short assignments and to the point" is the slogan here.

But, make it clear that the only *sensible* thing to do is to pass in the completed assignment *when it is due,* if possible.

The Course Duration.

It has been my experience that few men in industry care to tie themselves down to more than twenty consecutive recitations. One night a week for twenty consecutive weeks is a good schedule to follow. And the course should be given during the winter season so that other evening interests will not interfere.

A neatly engraved certificate should be presented to those attaining satisfactory completions. If the class is sufficiently large, simple graduation exercises may well be arranged for. It pays to do it.

The industrial mathematics class is well worth the conscientious instructor's time, and, if conducted as suggested above, will be a success and a joy to all connected with it.

SIMPLE UPHOLSTERY

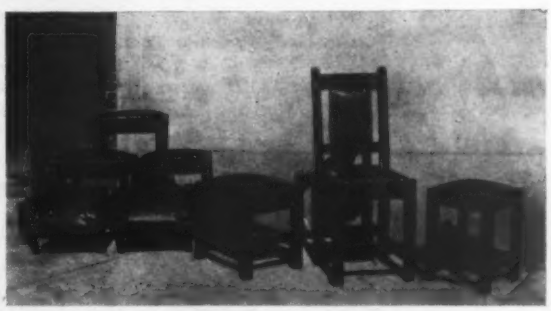
Leon H. Baxter, St. Johnsbury, Vt.

AN ELEMENTARY knowledge of upholstery will prove of great benefit to the boy in the woodworking department.

Such a knowledge enables him to broaden out in the variety and design of his work and allows him to use other tops for his footstool than the one of wood.

A great variety of chairs and footstools have been successfully worked out by pupils in the eighth grade using this interesting medium. The photograph below shows a few of the completed projects.

The following drawings, with their accompanying descriptive matter, should be sufficient for the beginner to successfully complete a footstool or other project of a similar difficulty.



UPHOLSTERY WORK.

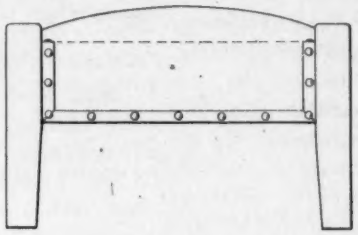
A. PLATE 1

UPHOLSTERED STOOL

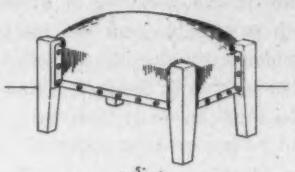
DIRECTIONS FOR SIMPLE UPHOLSTERY

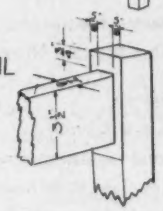
		THICK	WIDE	LONG
4	Legs	1¾"	1¾"	9"
2	Rails	⅞"	3½"	12"
2	"	"	"	8"
16	Dowels	½"-D		1⅞"

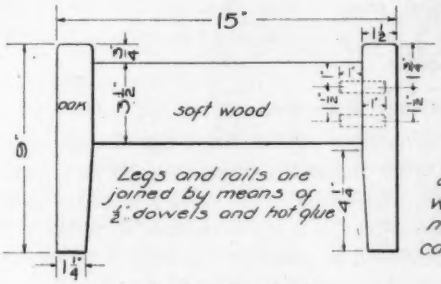
Stock List



VIEW COVERED





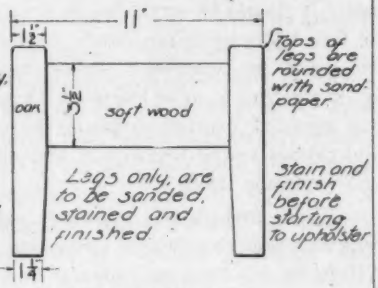


FRONT VIEW

Legs and rails are joined by means of ½" dowels and hot glue

The foot stool should be completed in joinery, before starting any upholstering.

If the sides are to be covered, as they are in this case, soft wood will answer very nicely as the tacks can be driven in easier.



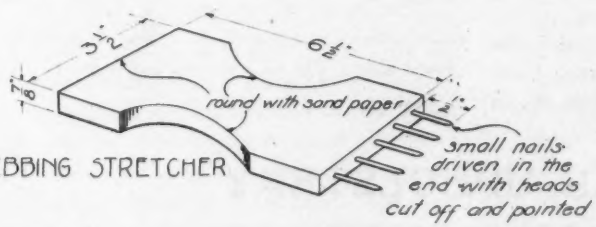
END VIEW

Tops of legs are rounded with sand paper

Legs only, are to be sanded, stained and finished

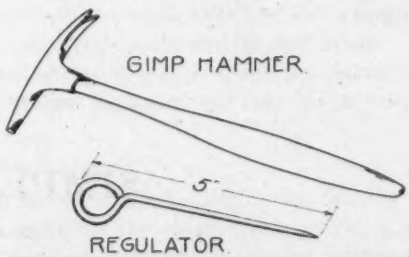
Stain and finish before starting to upholster

B. PLATE 2.



WEBBING STRETCHER

small nails driven in the end with heads cut off and pointed



REGULATOR

Made from a piece of heavy wire, pointed.

There are several kinds of webbing on the market. Select a strong close weave, 3½" wide. About 2 yards will be required for this stool.

The inner edge of the soft wood rails should be rounded over with file and sand paper, to prevent the webbing wearing thru. Fold the end of the webbing over about 1" and tack to the middle of the rail with 10 oz tacks, as shown, and pull tight with the webbing stretcher and tack; (fig. 1) cut webbing about 1" beyond the edge and fold back over and retack. Continue this operation until all of the webbing is in place, weaving as shown in fig. 2

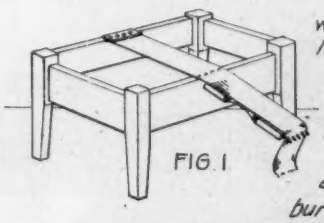


FIG. 1

The next operation is to cover the webbing with burlap. The burlap should extend about 1¼" beyond the edge on all four sides.

Take some of the material with which the stool is to be stuffed and make rolls a little larger than a lead pencil. Lay these rolls along edge of rails and turn the projecting edges of the burlap back over them tightly, and tack. (fig. 3)

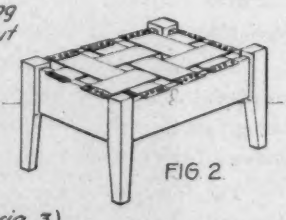


FIG. 2

This is to form a cushion on the edges of the rails to protect the final covering. The burlap should be tacked with 4oz. tacks.

C. PLATE 3

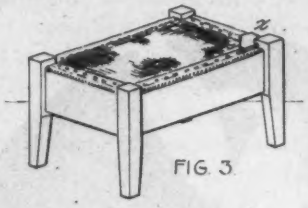
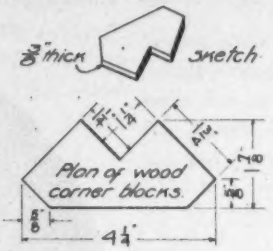


FIG. 3.



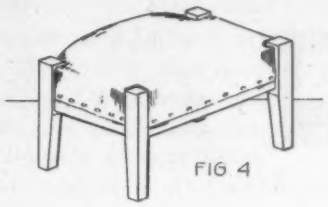


FIG. 4.

In order to have something solid to receive the corner upholstery tack which holds the gimp, there must be corner blocks made and bradded in the corners as shown in fig 3 at X, before proceeding further. These blocks are made of soft wood and should fit closely against the legs.

There are a number of materials which may be used as stuffing such as curled hair, which is the best, and also the most expensive, moss, cork, excelsior and tow. Tow is a very good material and is quite cheap. The fine tow is the best and one pound will be more than enough for this stool and will cost around 3 or 4 cents. The tow must be thordy pulled apart and spread evenly over the burlap, care being taken to remove any foreign matter. In order to have a firm, solid seat later the tow must be added until the pile seems higher than is really necessary.

The next step is to stretch a piece of muslin over the tow and slip-tack half way down the side of the rails with 3 oz tacks on every side (fig 4). Slip tacking is driving the tacks only part way in so that they may be easily removed to draw the muslin tighter.

The muslin must be fitted and cut around the legs and when placed satisfactorily it may be tacked on permanently and should then appear as in fig 4.

The final covering is next to be selected from either leather, textiles or artificial leather.

Artificial leather is cheaper than either of the other two and serves the purpose of the beginner very well. Pantasote is one of the good imitation leathers and a piece 20"x26" will cover this stool. This material costs about $100 a yard. Care should be taken to get a color which harmonizes with the color of the stain on the legs.

D. PLATE 4

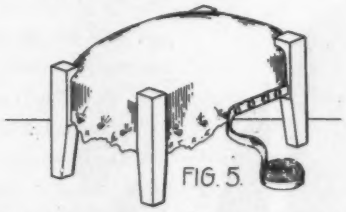


FIG. 5.

If after the muslin has been stretched and tacked the work looks uneven the regulator should be pushed thru the cloth and worked back and forth until the stuffing is arranged in a satisfactory manner. Perhaps more tow may have to be slipped under the cloth at the corners as all hollows should be leveled up.

It is customary to place a piece of sheet wadding over the muslin so that the outer covering will present a smooth and rounded appearance. This wadding comes in sheets 30"x36" and a dozen sheets are usually sold for 25 cents.

The outer covering is now ready to be put on and considerable care should be taken in cutting out around the legs. Do not cut in too far at first as it is better to cut the second or third time rather than to cut carelessly and ruin the piece.

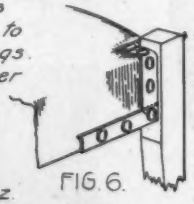


FIG. 6.

Slip tack the material similar to the muslin and stretch very tightly. The tacks may have to be removed and the covering re-stretched several times before the desired form and firmness is obtained. Care should be taken to place the tacks quite close to the lower edge of the rail as they are to be covered with gimp which is only ½" wide. Use 4oz tacks or smaller, and when the top of the stool appears as smooth and of as good form as it is possible to get it, drive in the tacks permanently.

The stool should now appear as in fig 5. Trim off the part overhanging and start placing the gimp. Use a gimp to match the covering and start against a leg as shown (fig 5). Space the tacks carefully taking care not to crowd them. Fold at right angles at the corner, doing this at every turn. On the inside corner of the legs, at the top, see that the tack gets a secure grip on the corner block. Fig 6 shows the method of nailing around the legs.

A wholesalers catalog will assist greatly in selecting the materials.

THE DECORATIVE STENCIL

Bertha Morey, Ottumwa, Iowa

THE possibilities of the decorative stencil never end. This age old method of applying interesting design to surfaces is revived with every good new stencil design. A stencil properly designed always has the ties that hold the parts of the design together and to be a good design these ties must be well placed and become a part of the design itself.

The one-stencil design is easy to handle, tho with thought and attention any number of designs may be used to develop a pattern. Thought and attention is a most necessary accompaniment to applying the stencil to the material as any misapplication of color is fatal.

Any material may be used for stenciling altho the heavy, rough-surfaced, coarsely woven materials seem to lend themselves to the spirit of the art better than the finer materials. Fine materials and a suitable design can of course be stenciled with good effect.

When using coarse material such as crashes, burlaps, heavy nets or art canvases the design should be larger and correspondingly broader than the design to be used for finely woven materials. The repeat may be small but the spaces of the repeat should be large enough to prevent their being lost in the meshes of the coarse material. For the fine materials as muslins, silks, nets and chiffons the design of the stencil must not be too large and the spaces and masses of the design should be well broken up.

ANOTHER STENCILED DESIGN.

The two designs illustrated are suitable for a number of household articles. Either are very suitable for all-over designs for over-drapes or couch covers. Used as a medallion they are excellent for magazine or telephone book covers, cushion tops, or chair seats or backs. The material used is a very heavy natural color crash and tube oil paints are used for the color. Three colors are used on each stencil design.

The stencil may be cut from any medium cardboard and given a soaking in hot parafine. After the parafine has hardened stencil this cut design on two other pieces of cardboard. On one cut out only the stems which will be the green of the design and on the other cut out only the flower parts; the centers of the flowers are made with a small oval hole after the flower color has dried.

To use the color as it comes from the tube is usually the best plan, but if it is so thick that it will not adhere to the material the color may be thinned with

A STENCILED DESIGN FOR HOUSEHOLD ARTICLE.

STENCILED MEDALLIONS.

turpentine. The paint should not be thinner than very heavy cream and very little on the brush at a time.

Brushing on the paint is the test of stenciling. After the pain is well rubbed in the ends of the bristles, stencil the color on the material with a stippling stroke.

The stencil cut first is now stenciled to the material. Stencil the stem next, and the flower next, and when dry the yellow center may be placed.

Oil-paint stenciling washes if a little care is exercised. Chinese blue will stand the hardest possible treatment for years but the others require gentler treatment of warm water and mild soap. After some years the design may become faded or have disappeared.

To remove old faded stenciling soak the painted parts in a mixture of half denatured alcohol and half benzol. This will not injure the material if well washed and rinsed.

COURSES FOR RECONSTRUCTION—V

Brick and Concrete Building Construction

C. R. Miller, Williamson Trade School, Williamson, Pa.

Summary of Course.

THE work during the first three months relates to bricklaying practice in American or common bond. Trade materials, methods and blue print reading, are introduced as related subjects. Freehand orthographic sketching is carried thru the first six months and vocational mathematics and English are continued thru the entire year.

During the second three months shop practice consists of facade work, together with shaft and chimney construction. Materials and methods cover building layout and practice in leveling, using straight edge and boring rods.

The third three months are devoted to elementary concrete construction and plastering. Leveling with the builders' level and first principles of estimating are taken as related subjects.

During the fourth three months practice specialties are introduced in shop work. Such projects as "built in" frames using joggles, "furring" and similar trade applications are taken. Practical estimating receives considerable attention during this period.

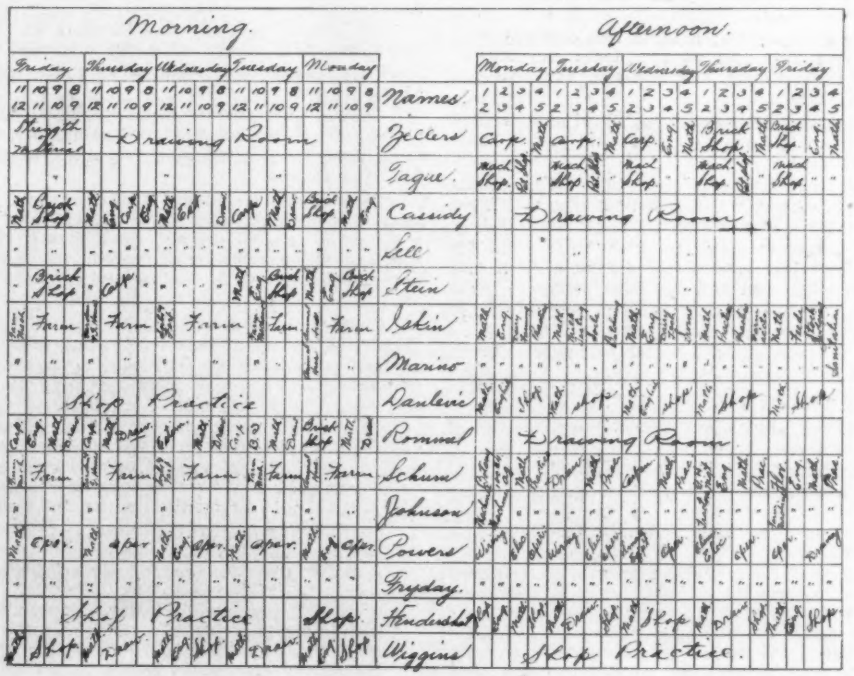
The following texts are used in this course:

Bricklaying System, Gilbreth.
Building Estimator, Arthur.
Materials and Construction, Pratt.
Vocational Mathematics, Dooley.
Effective English, Claxton & McGinnis.
Motion Study, Gilbreth.
Construction and Superintendence, Kidder.
Kidder's Handbook.
Cement, Concrete and Plaster, Hodgson.
Inspector's Handbook, McCullough.
Field System, Gilbreth.
Architectural Drawing, Edminster.

Twenty-four Hours Per Week Thru the Year.

Shop Practice.

It is assumed that a number of men will be working together on the following trade exercises, particularly the larger projects. The small elementary exercises should be constructed by each man so that the principles involved



A CLASS SCHEDULE.

may be thoroly understood. The number of men which can conveniently work on the large projects is placed after the name of the project.

1. Four inch wall with returns, not bonded.
2. Eight and one-half inch wall with return and intersecting wall; American bond.
3. Thirteen inch plain wall, Common or American bond.
4. Seventeen inch plain wall, Common or American bond.
5. Twenty-one inch plain wall, Common or American bond.
6. Twenty-five and one-half inch plain wall, Common or American bond.
7. Plain four inch unbonded wall, thirty feet long for gang practice.
8. Seventeen inch by thirty inch base and bonded chimney top having one withe.
9. Thirteen inch house wall, with window frame "built in." Two men.
10. Nine inch solid wall in single Flemish bond.
11. Thirteen inch wall with return and intersecting walls having Flemish bond on both faces, or double Flemish bond.
12. Octagonal shaft, five feet, six inches across flats, seven feet, six inches high, wall to be four inches thick.
13. Nine inch solid wall in American bond; this wall to be 53 feet long with returns, laid up in cement mortar to a height of five feet. Four men.
14. Nine inch bonded segmental arch four feet, six inches span, six and three-quarter inches rise in thirteen inch wall. Two men.
15. Nine inch bonded semi-circular arch in nine inch wall; the top of panel in which arch is to be built. Two men.
16. Bonded Gothic arch in thirteen inch wall; span five feet; clear height of opening in wall six feet. This arch to appear in a patterned panel, tapped by a sixty degree gable in stretcher finish, ends formed by pilasters, run up to start parapet walls in return; panel laid in English bond. Four men.
17. Nine inch bonded elliptical arch in thirteen inch wall; panel laid in single Flemish bond. Two men.
18. Reinforced concrete construction; fence posts and telegraph poles to be made up; reinforcing properly located, according to drawings, concrete properly worked around reinforcing, and work well finished; holding bolts and lugs to be accurately located. Two men.
19. Enameled brick work; American bond, flush joints, flush pointed with hard mortar; joints not over one-eighth inches thick. Three men.
20. Chimney construction; a three flue chimney with properly constructed fireplaces on two floors and connection for furnace in basement, thimbles and flue lining to be introduced. Five men.
21. Boiler setting; setting a 36 inch horizontal return tubular boiler, including firebrick linings and proper hanging of shell. Ten men.
22. Boiler setting; setting a water tube boiler, drums to be slung from overhead, walls of hollow type and faced inside with firebricks. Twelve men.
23. Steel skeleton construction with terra cotta encasement of structural members, introducing column covering, wall construction and arches. Four men.
24. Assembly construction. A piece of work involving about 12,000 bricks, requiring speed and skill. This work should meet all trade specifications for commercial brick work in its particular class. Twelve men.

RELATED SUBJECTS.

Four Hours Per Week.

Architectural Drawing.

Text: Edminster's "Architectural Drawing."

Sheets 1, 2, 3, 4 are the same as those outlined under the course in Mechanical Drawing.

Sheet 5. Tracing of a standard Architectural Drawing including all details.

Sheet 6. Elements of projection as applied to architectural drawing; models used to be parts of buildings. (1) Front, top and side view of a simple shape without dotted lines; (2) same introducing dotted lines; (3) same introducing a section; (4) section thru floor and partition, plate 79. Problem showing partition parallel to joists. Put in names of all parts, together with all dimensions.

Sheet 7. Studies in architectural detail (1) Section thru water table, plate 68. (2) Section thru cornice, plate 69. (3) Window, with sections thru stile, sill and head. (4) A standard four-panel door showing details of all joints, and names of all parts. (5) Chimney construction, plate 88, names of all parts, dimensions given, sections drawn and thoroly studied. (6) Standard construction joints, plates 89 and 90, the relative proportions of dimensions of joints studied, in relation to the size of timber spliced, and formula worked up for proportions of various joint elements, each joint named and formulas lettered in. It is assumed that unit No. 7 will require four large sheets, the first four problems on one sheet, and the last two on another sheet. All details shown should be full sized according to the practice in this class of work.

Sheet 8. Elementary studies in masonry as used in construction. (1) Names of various types of stone bonds, plate 92. (2) The various bonds applying to brickwork as previously given. (3) The various arch formations showing dimensions and details of construction; each arch properly named. All of unit No. 8 on one sheet, properly balanced to give desired appearance.

Sheet 9. Studies in elevations, plates 80 and 81. This job laid out to size as shown in scale of stories, calls attention to simple method of representing wall finish, lattice work beneath porch, underpinning.

Sheet 10. Framing plans and elevations, plates 82, 83, 84 and 85. Two sheets under unit No. 10. Each timber used explained, name of each part and purpose. All work carefully laid out to dimensions. From the drawings made up under units 9 and 10 a full bill of material is to be taken off and made by covering construction complete to and including the plastering. No interior trim except door and window casings included in this bill.

Five Hours Per Week.

Estimating:

Text: Arthur's "New Building Estimator."

Work in this text should be taken in the following order: Brickwork—Study of all printed matter of the chapter. Work problems in estimating as follows:

Estimate of job in American bond; warehouse style of construction; give number of bricks, amount of sand, lime and length of time for ten bricklayers to lay bricks. Estimate brickwork of one-story machine shop of slow burning mill construction. Shop to be 100 feet long, 60 feet wide as shown in Kidder's "Architect's Handbook." Chapter on municipal work. Estimate on a circular sewer, four feet diameter, one mile long, giving all details and time for ten bricklayers.

Chapter on plaster. One estimate on two coat work. One estimate on three coat work, quantities given for lath, nails, hair, sand, lime, together with time allowed for four plasterers and two lathers.

Chapter on concrete. As a problem, estimate foundation for engine, giving amount of form lumber, cement, stone, sand, time for two laborers, two concrete men. Estimate for hand mixing.

Chapter on carpentry. Millwork, glass, hardware, and miscellaneous materials. As a problem with these chapters work up a detailed estimate of a small frame garage of standard construction. State number of mechanics needed to complete the job in twelve working days of nine hours each.

Chapter on stonework. Estimate on the stonework of a brick and stone house having stone foundations, lintels, window and door sills. Give time for two stone masons to complete job.

Trade Technique.

This work aims to give the student a knowledge of the various processes, materials and standards of construction used in the building trade. Regular class should be held in this subject and definite assignments made each day. The texts should be studied in the order named:

"Bricklaying System," Gilbreth.
Motion Study, Gilbreth.
Building Construction and Superintendence. Vol. on Masonry, Kidder.
Cement, Concrete and Plaster, Hodgson.
Reinforced Concrete, McCullough.
Field System, Gilbreth.
Inspector's Handbook, Byrne.
Architect's Pocket Book, Kidder.

The Projection Box: Its Use in the Schools

William Y. Winslow, Supervisor of Industrial Arts, North Tonawanda, N Y.

ONE of the most difficult things of accomplishment for the teacher of mechanical drawing is to present understandingly a correct arrangement of the views of construction. Indeed, sometimes we find draftsmen of considerable experience turning a view around. Once the student has learned to distinguish between picture drawing and working drawing he is ready for the projection box. "Give me a set of drawings from a high school class, the work of the year," said a supervisor of mechanical drawing recently, "and I will tell you whether or not a projection box has been used in presenting the work."

There is probably no teacher of mechanical drawing who has given much thought to the matter and who will not agree that the projection box is a decided advantage in teaching his subject. There are several reasons why the box has not been used in the schools. Oftentimes the teacher of mechanical drawing is not the shop teacher. He realizes the necessity of having a projection box for demonstration purposes in teaching blue print reading or the rendering of working drawing. This teacher is not in immediate contact with the means of production. However, he should design a good box and see that his design is carried out in the shop even tho he has to do the work himself. It is probable that he can interest one of the boys in his classes to make a box in the shop.

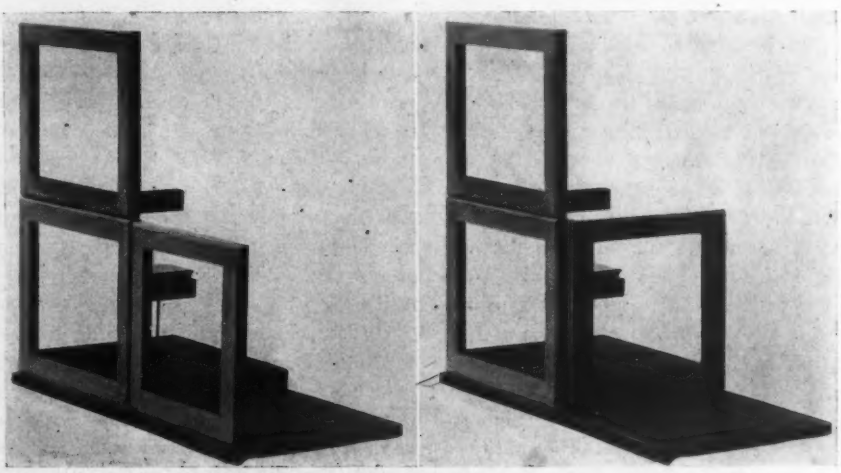
In some schools the shop teacher has charge of the mechanical drawing. In addition to teaching he may have to do grade supervision; he may have stock to get out, supplies to order, reports to make. This man has seen the projection box used, in fact he has obtained his knowledge of working drawing by means of it. He has often wondered whether the box would be suitable for the seventh or eighth grades or for the high school but on account of pressing demands upon his time he has never put the matter to the test; that is, he has delayed making the box.

Our mechanical drawing teacher may be following a certain course of study in which the use of the box has been omitted. If asked why he does not use it he replies that "the department should furnish such apparatus." For a long time this teacher has been looking for the "firm which handles projection boxes," that he may recommend the purchase of one. Up to the present time he has not found the firm. He does not pick up a book on drafting without seeing the box illustrated so he doubtless realizes its importance.

And again our teacher illustrates the projection box on the board. He explains theory as best he can. However, his illustrations need something in the way of motivation for he invariably tries to explain them by means of manipulating a couple of transparent triangles. In reality he is feeling for a projection box. Granted these boxes are used mostly in technical schools and colleges at the present time, the teachers of mechanical drawing feel a need for them which nothing else can supply.

But our live teacher will have the box; he is teaching theory and he admits it. He realizes that well-directed action is invaluable in securing the attention and he explains theory with a tangible illustration. The photographs here shown give a clear idea of a projection box suitable for use in the public schools above the sixth grade. By a study of the illustrations a high school boy with a little assistance can work out an excellent box of convenient size which will be of service not only to classes immediately engaged in the work but to succeeding classes as well. The box is designed for the customary third angle and contains two vertical planes for elevations and one horizontal plane for the plan.

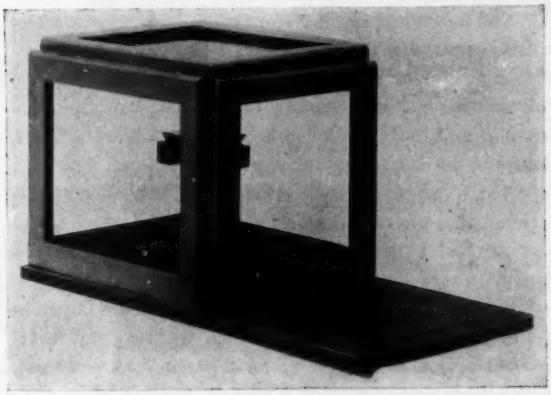
It will be noticed from these illustrations that the floor of the box proper is on a level with the lower edges



PROJECTION BOXES WITH TOPS OPEN.

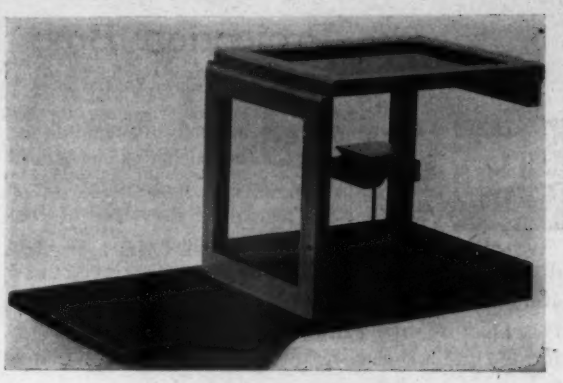
of the panes of glass constituting the vertical planes. When the solid under consideration is not supported, as is the one in the illustrations, it can be placed directly on the floor of the box and then shoved to each vertical plane for the purpose of making clear the projection or movement of points. The solid can be lifted until it touches the horizontal plane for the same purpose. After this procedure the side vertical plane and the top horizontal one are revolved into one plane with the front vertical one which is stationary. Now the three views are in their proper relationship as a draftsman would render them.

Some projection boxes are made with fine mesh wire netting for the planes rather than glass. The advantage of such boxes lies in the fact that by means of



A FRONT VIEW OF PROJECTION BOX.

blackboard crayon, lines may be drawn on the respective planes to indicate the views of a solid, and the planes then revolved to lie in one plane. However, the glass box is more serviceable and its transparency is a decided advantage.



THE BOX AS SEEN FROM THE REAR.

The box shown in the illustrations has been used in both school and army reconstruction work to give the student in the quickest possible time a workable knowledge of the principles underlying the making or reading of working drawings. In the part-time schools the need for such a box will be keenly felt by teachers of industrial subjects where information must be conveyed in such a way that it can be easily and quickly grasped.

It will be found that when the principle of orthographic projection is understood the box can be put aside where it need not be used except for the clarifying of ideas. The box can tell in an instant what it would take the best teacher endless moments to explain. If the projection box is given a trial anywhere above the sixth grade it will never again become the exclusive property of the technical school and the college.

WAXES—THEIR USE AND ABUSE

Ralph G. Waring

THE use of wax for polishing is as old as antiquity itself. The Egyptians used it on their marble statues to develop the appearance of age and on their sandalwood furniture in order to increase the natural odor of the wood.

In later centuries the practice has continued, and in English hamlets and elsewhere many housewives still follow the methods of their forebears. An old English recipe has it that one should 'Feed the wood with oil and polish with wax."

This method has some recommendations for mahogany, in that it does develop a wonderful color and richness, so peculiar to the genuine type of this wood. As practiced for generations on the same piece of furniture the result has never been pleasing to me, as I have studied antique furniture in its various forms. Some years ago I had charge of the shop of an importing firm which made a speciality of collecting antiques the world over. I remember well one shipment of mahogany from Devonshire. The pieces were splendid in design and workmanship; the color of the wood was superb, but the distasteful thing which spoiled it all was the accumulation of wax and dust in every possible corner. So hard was the material that it was necessary to practically cut it out with small chisels and varnish remover. After cleaning up the work carefully, it was refinished in varnish and carefully rubbed out to a soft semi-gloss finish, now known as "egg shell gloss". Then the wood exhibited all the beauties of grain and parquetry, things not noticeable under the wax finish which simply suggested to the understanding of the trained eye that there might be possbilities beneath.

Last summer, while camping in the Adirondacks, I visited Litchfield Park, N. Y., where Lord Litchfield has built an English manor house in a setting of thousands of acres. Immensely wide and high walls predominate in the Trophy room and dining hall and in the latter the panels form a wainscoting—seven feet

high—of large finely figured mahogany. This had been treated with linseed oil and turpentine, allowed to dry and then waxed. Within ten years of use it had already begun to show that dead, lack-luster appearance peculiar to this treatment; whereas if the same panels had been properly varnished and polished, the wonderful grain would have made panels of great beauty. To the American housekeeper in charge this method represented a monthly expenditure of many hours of very hard work, quite discouraging even to a natural-born housekeeper. Had the wood been properly varnished the panels could have been easily cleaned and polished with much less labor. In years to come those beautiful panels will lose all their brillancy of color and figure beneath the gradual accumulation of oil and wax, even tho they are receiving the best of care.

To some extent, this fault may be prevented by a coat of shellac or varnish which will prevent the penetration and adherence of excess wax. After thoro hardening this material may be sanded smooth and then waxed by enclosing a tablespoonful of the prepared material, in a piece of cheese cloth and using as a pad apply to the wood. The wax should be allowed to harden for an hour and then should be rubbed briskly across grain with a stiff bristle brush. Afterwards a piece of heavy woolen flannel must be used to polish quickly and lightly with the grain of the wood. This should be repeated at least once to get good results on floors. Once over will be sufficient; if the work is done regularly once or twice a month a weighted brush should be used instead of a cloth. Worn spots near doors should be shellaced and allowed to harden before waxing.

To the instructor in the school shop, this method affords a cheap way out of the problem of teaching finishes; but to me it has always been that where I found an instructor using wax finishes, it was because he did not know any better or else was too lazy to study and read up on good methods of finishing. A piece may be stained with a cheap spirit stain, shellaced and waxed and pronounced "finished" and so it is, but no one is proud of its beauty of color or grain or finish—because it has none.

To me the final test of any material should be considered in terms of practicalities. Will it wear; does it resist water; will it last very long after I have done the work; will it please others to see it? Even with the best of care in application a wax finish will not stand wear, will not resist water because it spots white; is very temporary; and very seldom pleases anyone of taste or discernment.

PRODUCTS OF AN EVENING CLASS IN BASKETRY.

The illustration above is a part of the work produced in night classes in basketry in the Fort Dodge High School. The work was done under the direction of Miss Emma G. Kftt and her assistant, Miss Lucille Brunner. The class included fifty young women, who met once a week for a period of two hours during a term of twenty weeks. The work included simple basket making for beginners and advanced work for expert weavers. The class was required to visit furniture stores and to sketch articles which they had seen. From these sketches, designs for trays, waste paper baskets, window boxes, hampers, reading lamps, and floor lamps were designed.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

COMPETITION.

It is reported that in one summer school where teachers are prepared for instruction in athletics and in Industrial work, a conflict in the program made it impossible to register in both courses. Several prospective teachers of both subjects were forced to make a choice, and the choice was invariably in favor of athletics. When asked why this choice was made, the teachers asserted that their success as coaches depended on their ability to turn out winning teams, but that in the industrial arts they could get along passably well with less understanding of the work.

The significance of this incident to us lies in the fact that one kind of instruction is pronounced by competition, while other school work of equal merit is made secondary by the lack of competition.

We have all seen competition between classes of the same school and schools of the same class used as the incentive to exceptional effort. To be sure, we have seen examples of the misuse of competition, as in the overpronouncement of contests in athletics; but the natural delight in a contest cannot be dispensed with as an incentive to effort.

The extreme communist disparages contest and competition as an incentive to work, yet the very pronouncement of this conviction is a contest in which he delights and which keeps him persistent in his conviction.

There is a large element of personal pride in every human interest. This pride finds expression thru active contest. The average of humanity must of course fall within the average standard of accomplishment, but no interest in school or out of school can hope to succeed, that does not maintain a high average standard by competition.

PROPRIETY IN ART.

Nothing is more indicative of a lack of that tasteful demand which the esthetic mind and eye exercises than the sufferance of incongruous and faithless materials. Service is as much required in art as food value is required in diet. In art the visible effect is the means of impression, but if the impression is not supported by a substantial result no lasting benefit can be derived.

It should be demanded of any art that it not only uplifts but that it also sustains. A work of art looks the better for wear, improves with age, and is a permanent and increasing blessing to humanity. Measured by this standard, the fine art of teaching the fine arts has not been especially successful in America.

The very term "Art" is in bad repute. It is conceived as something devised for incidental and transient effect. Our lack of standards is evident in the marketable riff-raff of our stores. In the overproduction of exciting and amusing stuff published in our magazines and papers. In the constantly changing styles. In the advertising stunts of those who seek pronouncement.

We believe that a reaction is due in school affairs against this clamorous demand for something new and unique, and especially is this so of art instruction. The temptation to use a great variety of materials in order to get a great variety of effects in our industrial art work has resulted in a superficial use of them. Perhaps the financial stringency of the present year will be a blessing in disguise.

TEACHER, FARMER, AND HOUSEWIFE.

There is a tradition to the effect that the teacher and the farmer work by different calendars. That interval between most conclusive efforts which the producer of material things enjoys in the dull of the winter season, comes to the teacher in the heat of the summer, *if it comes at all.*

The modern teacher is much like the housewife, in that her work is never done. Yet the teacher has one distinct advantage over the housewife. The housewife has little prospect of a seasonal change of work. The teacher, on the other hand, has the possibility of turning to something quite different than schoolroom routine between June and September. We are inclined to the advantage of such a change for the teacher, even tho the coveted college degree may be postponed. No year has been quite so propitious as this for the teacher to enter into some business or trade activity during the summer.

ARTISTIC SALVATION.

LET those who have dreamed of a time when art would be universal take heart. The secret of the ages, "Dynamic Symmetry" by name, has been rediscovered, and will be set forth for the first time in book form by the Yale University Press.

What is Dynamic Symmetry? According to Jay Hambridge, who should know, for he rediscovered and named it, Dynamic Symmetry is "certain principles of design found in the architecture of the human frame and of plants."

Known to the Egyptians and the Greeks, this esthetic secret was lost to the Romans, whose deluded representative Vitruvius "fell back to the lineal system, and *has misled designers ever since.*" Mr. Hambridge asserts that "the same ratios of space to space underlie the arrangement of the seeds in a sunflower, of the ribs in a maple leaf, of the features in a Greek carving, and of the ground plan of the Parthenon."

Would you design a fine pattern, picture, or palace? Apply "Dynamic Symmetry" and the trick is turned. Would you identify artistic excellence? Then measure the sample by the irrevocable standards of Dynamic

Symmetry. Would you appreciate and enjoy art in any form? First be certain that the object of your prospective enjoyment will bear the test of ratios that are necessary to all that should be enjoyable.

There is but one slight element of sadness in our anticipation of the artistic salvaton promised by this discovery. Dynamic Symmetry will be added to the already long list of things that must be learned by the art teacher. We hope that our ignorance may escape notice this fall, for we will not have time this summer to recover from a lapse of two thousand years of bad design and poor instruction.

THE NEW TEACHER'S FIRST RECITATION.

THE opening of another new year will find a multitude of new and inexperienced teachers beginning their careers. These new members of the profession have come to fill the rapidly thinning ranks which have suffered from the competition and attraction of the business and industrial world. They will try out their theories and the plans which they have been taught. They will meet their disappointments and sometimes find that their pet "models" or "projects" will arouse only resentment, or at best but a languid interest among the boys who come for instruction.

Perhaps the most bewildering experience which a young teacher can have is the very common experience of having a large class made up of boys whose experiences in the shop range all the way from nothing to several years of consecutive work. What shall he do with them? Shall he spring one of his graduated "models" on them which perhaps many in the class have already made? Shall he subject the whole group to the instruction and work designed for the beginner? Or shall he undertake in the very first lesson to assign such a variety of work as will meet the individual needs and wishes? Any one of such suggestions, if followed, would bring disaster, as those who have tried it have abundant reason to know.

The first recitation for the new teacher is the "get acquainted" period. The teacher is unfamiliar with the class and the boys are unfamiliar with the teacher and with his manner and method. Probably but meager records have been left to guide in the work. Hence the first recitation is essentially an opportunity for the teacher and pupils to familiarize themselves with one another. This does not mean to fool away the time gossiping about the former teacher and work, or to waste time in an attempt at good-fellowship. It means that the wise teacher will base his first work upon this "get acquainted" idea. The very first part of the recitation may very properly be devoted to an investigation as to what the pupils know about the shop and its equipment, what they have been able to accomplish with such equipment in the previous years, what they remember of the proper methods of work in such shop, how such an equipment and such work relate to activities and needs outside the school, and what they regard as the proper procedure in planning a problem for construction. In such an investigation, the teacher will show the most sympathetic attitude toward the pupils' former work. He will inevitably and miserably fail, if he unwisely begins to criticize their work, or to condemn the methods of the former teacher. The former teacher has the claim on the respect and confidence of the boys, and if his methods have not been correct, the new teacher must wait and discreetly make such changes gradually as his own stock rises in the estimation of the boys.

The second part of the recitation may well be devoted to a very brief test of the pupils' skill in the work, on the ground that the new and unfamiliar teacher would like to have the boys show him what they can do in the handling of the tools, how they proceed in attacking a problem, how much to expect of them in the work, and how advanced work they are capable of doing. A simple little squaring up and sawing test will suffice for this.

After this contact with the pupils which gives a considerable familiarity with the situation and makes the boys feel that they are going to be classified absolutely according to their ability, the teacher may safely propose his scheme in general terms for the future and start plans for the next lesson.

The first recitation is an important event. It is a busy time, and it should not be just a talking time for the teacher. A very large part of the talk should come from the pupils and a considerable part of the recitation should be devoted to activities of the pupils themselves. The teacher will make a serious mistake if he undertakes at the first meeting of the pupils to give them long lectures about tools, woods, etc.

The wise teacher will first establish himself in the confidence and respect of the class; will sympathetically and cautiously find out what the experiences of the boys have been; will put them immediately to vigorous work which will give them a chance to demonstrate their ability, and will lead them hopefully and interestedly toward the work which he hopes to have them accomplish in future recitations.

I am of the opinion that if our people had gardens of their own to cultivate, and worked fewer hours at their productive work, they would with a little organization produce quite as much of their handicraft as before, and in addition the bulk of the produce needed for their own consumption; while the gain in health to their families and in the amenities of life would be incalculable.—*C. R. Ashbee.*

Let no act be done at haphazard, nor otherwise than according to the finished rules that govern its kind. —*Marcus Aurelius.*

There is no task, not even digging a ditch, but has interest and even romance in it, if you dig the right way. —*Amos Wells.*

LITTLE ARGUMENTS ON GREAT PRINCIPLES

ON SALARY AND SERVICE.

"Mr. Try Square, I am surprised and delighted to see you back at the old stand," said Frills graciously.

"Well, it was a close call!" replied Try Square. "But why are you surprised to see me back? Did you expect me to lose my job at a time when teachers are so scarce and jobs so plentiful?"

"Oh, no, not that, I assure you, Mr. Try Square! But do you know that teachers who are able to do anything but teach are leaving the schools for business?"

"Yes, I know that very well indeed," answered Try Square. "I have been trying all summer to get enough money from the school board to hold my staff together, and now as we are ready to begin the school year the least paid man in my department is getting twice the money I got after ten years of teaching."

"Just so, and justly so!" said Frills. "They are getting twice the money, but it is only worth half face value. You must agree that wages should go up with expenses. A dollar is only worth what it will buy, and a dollar of 1910 was worth two of 1920."

"Yes, I know that very well, too, Mr. Frills; and if I was in a position to spend the people's money, I should not hesitate to mortgage their savings for their children's education in certain lines."

"In certain lines!" repeated Frills. "And I suppose those lines would be the subjects you teach, Mr. Try Square. Mechanical Drawing; Shop Work; Manual Training; and wouldn't you help out the poor Art teacher, Mr. Try Square?"

"No, I was not thinking of any certain school subjects," replied Try Square. "Neither was I thinking of running the people into debt to train the children to make more money. That idea is already well promoted. I was thinking of raising the value of the 1920 dollar by giving a dollar's worth of service for every dollar earned. As you say, 'a dollar is worth only what it will buy.' At present the teacher and preacher, baker and butcher, and the makers of candle sticks, coat hangers, and towel rollers are giving fifty cents' worth of service for every dollar they get. Let's go to work and raise the value of the 1920 dollar by giving value received. The teachers must be taught to teach the children to teach their parents to teach the nation *to give a dollar's worth of service for every dollar they receive,* and the best way to teach is to practice what you preach as well as to preach about your practice. Let's go to work!"

"Agreed!" said Frills thoughtfully. "And here's hoping that next year we will be able to earn a little more than we can live on."

THE N. E. A. AT SALT LAKE CITY

The Salt Lake City convention of the National Education Association, July 4 to 10, was marked by the acceptance of a new plan of organization by which the control of the national body of educators is to become representative and is to knit all the state and local organizations into one large, representative association. As in previous years the program was devoted very largely to general discussions of broad problems of elementary and secondary education, and did not enter deeply into the particular work of the newer and more highly specialized departments of the schools. One general session was devoted to industrial education. The Department of Vocational Education met on two afternoons. There was barely a mention of the part-time school during the week and the enormous questions involved in preparing programs of studies, of finding teachers and of providing classroom facilities for the thousands of new part-time pupils next September were but briefly touched upon.

The association emphatically declared itself for general education in the following resolution:

"Be it resolved, that the National Education Association stress the crying need that general or cultural education must not be overshadowed by vocational training; that on the contrary, it be emphasized and strengthened and animated along the whole front of educational activity; that in the changed order of things today there is still no excellence without great labor and that no adequate education can be secured by the youth of America without paying the price in long years and hours of hard intellectual efforts."

The sessions of the Department of Vocational Education were presided over by Mr. John Callahan of Wisconsin. At the first session home economics, teacher training and vocational testing were taken up. Part-time schools and the training of foremen divided the attention of the second meeting. The speakers included Mr. Callahan, Prof. Arthur F. Payne, Mr. F. W. Kirkham, Mr. Newton Van Dalsem, Mr. James R. Coxen, and others.

The Department adopted a series of resolutions favoring the broadening of its interests to include agricultural, trade and industrial, home economics and commercial education. It asked for recognition on the general program and in the press bulletins of the association. The Department asked for $1,000 for carrying on studies and investigations in vocational education.

The Vocational Guidance Association held a meeting on July 7th under the leadership of Mr. John Brewer.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

SAW HORSE STITCHING CLAMP.

Louis M. Roehl, Instructor in Farm Shopwork, New York State College of Agriculture, Ithaca, N. Y.

A stitching horse is an essential part of the equipment needed by farmers for keeping harnesses in repair. It forms a simple problem in shopwork for agricultural high schools and may be worked out for school or home farm use.

A stitching clamp may be made by a clamp and lever arrangement attached to a saw horse. The clamp is removed from the saw horse by driving the key out of the keyway and the lever is removed by loosening the nut on the bolt in the leg. The clamp may then be hung some place in the shop or barn until further call for its use and the saw horse used for other purposes.

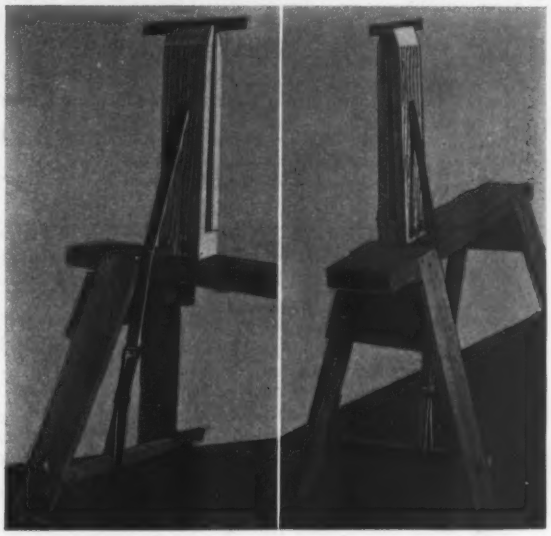
Material Required.

Lumber.

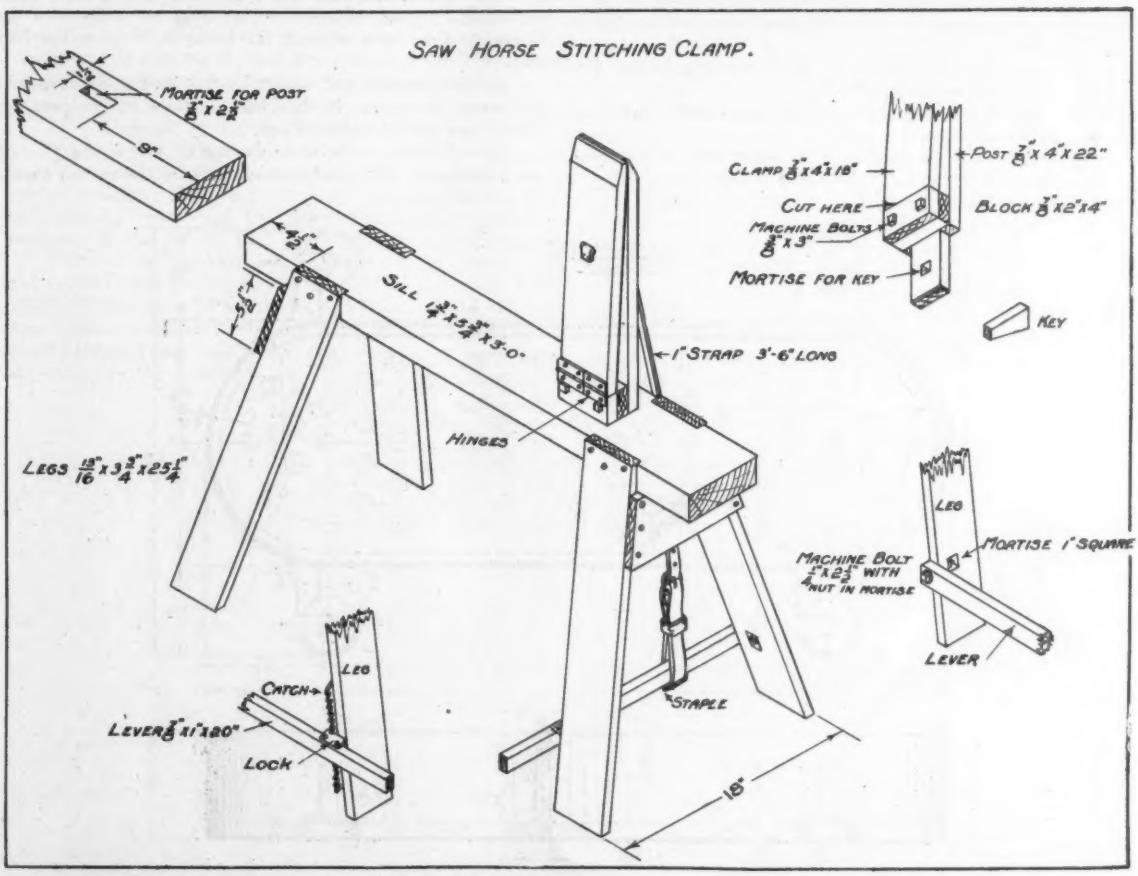
Pieces	Dimensions	Use
1	1¾″ x 5¾″ x 3′ 0″	Sill
4	1⅜″ x 3¾″ x 25¼″	Legs
2	1⅜″ x 5½″ x 10¼″	Braces
1	⅞″ x 4″ x 22″ (hardwood)	Post for clamp
1	⅞″ x 4″ x 18″ (hardwood)	Clamp
1	⅞″ x 2″ x 4″	Block at bottom of clamp
1	¾″ x 1″ x 3″ (hardwood)	Key
1	⅞″ x 1″ x 20″ (hardwood)	Lever

Hardware.

24 flat head bright wood screws 1¾″ No. 10.



SIDE AND FRONT VIEWS OF STITCHING CLAMP.



2 machine bolts ⅜″ x 3″ to bolt clamp, block and post together.
2 2″ fast joint light narrow butt hinges with screws.
1 machine bolt ¼″ x 2½″ with two washers for end of lever.
1 piece of metal ⅛″ x 1″ x 6″ for catch.
1 piece of metal ⅛″ x 1″ x 2″ for lock.
1 1″ strap 3′ 6″ long.
1 1″ buckle.
1 1½″ fence staple to hold strap in place on lever.
1 1″ slide loop.
1 piece of tin 1″ x 2″ to place in hole in post for strap to slide on.
2¾″ brads to fasten end of strap to clamp.
1 coil spring to spread clamps.
6 ⅞″ No. 7 or 8 round head blued screws to fasten catch to leg and lock to lever.
2 poultry netting staples to fasten key to end of post by use of a string to prevent its being lost.
1 piece of heavy string 8″ long to fasten key to end of post.

Directions for Construction.

1. Reduce all pieces to length, width and thickness.

2. With the T bevel set at 22″ on the beam and 4½″ on the blade of the steel square lay out the bevels at the ends of the legs across the side of the boards.

3. With the T bevel set at 22½″ on the beam and 5⅞″ on the blade of the steel square lay out the bevels at the ends of the legs across the edges of the boards.

4. Bevel the edges of the legs with the T bevel set at ¼″ on the beam and 6″ on the blade of the steel square.

5. Lay out and cut openings in the sill for the legs ½″ deep at the top with the T bevel set at the same angle as for the ends of the legs.

6. Lay out and cut the bevels at the ends of the braces.

7. Bevel the top edges of the braces so that they fit tightly against the top.

8. Lay out and cut a mortise in the sill for the post ⅞″ wide by 2½″ long, 9″ from the front end and 1½″ from the left side.

9. Assemble the parts of the horse by placing the screws as indicated in the drawing.

10. Bevel the top ends of the post and clamp as shown in the drawing.

11. Cut a ⅜″ shoulder on the lower end of the post so as to make a tenon 2½″ wide and 4″ long.

12. Cut an ⅛″ chamfer on the end of the tenon of the post.

13. Mortise a hole for the key thru the tenon of the post. The top edge of this mortise is straight thru the stock; the bottom edge is slanted like the key. The mortise is placed about 1/16″ nearer the shoulder on the post than the thickness of the sill so as to cause the key to draw the post down tight onto the sill.

14. Make mortises ⅜″ x 1″ for the strap thru the post and clamp at 6″ from the top.

15. Bend the piece of tin in the mortise in the post and fasten with brads. This is to provide a smooth surface for the strap to slide on.

16. Bolt the post and clamp together with the ⅞″ x 2″ x 4″ block between them at bottom using the ⅜″ x 3″ machine bolts.

17. Fasten the hinges in place, then remove the hinges and saw the clamp in two at two inches from the bottom. Then replace the hinges. This leaves a saw kerf between the parts and permits the clamp to close at top.

18. Fasten the coil spring between the post and clamp.

19. Make a mortise 1″ square in the front, left leg 4″ from the bottom and 1″ from the inside edge.

20. File notches similar to the teeth on a rip saw in one edge of the metal catch as shown in the detail drawing.

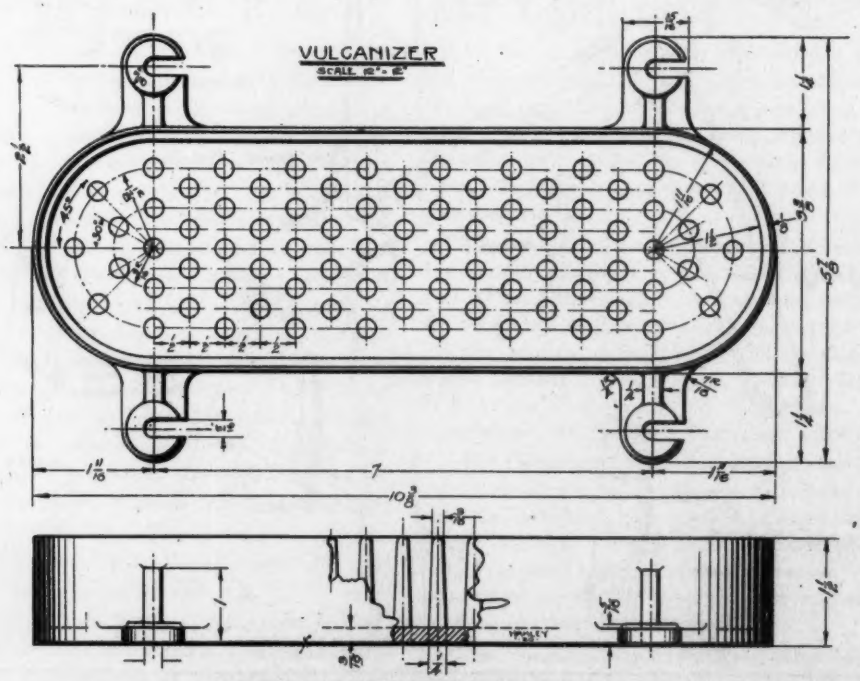
21. Drill four holes thru the metal catch near the back edge for the screws. Then fasten the catch to the right front leg only as shown in the detail drawing.

22. Drill two holes thru the metal piece for the lock and fasten to the upper edge of the lever so as to lock onto the catch. The metal piece should be gained in at back so as to stand at a slant. The lower edge may be ground or filed so that it will fit up into the notches of the catch.

23. Straighten out the fence staple and bend so as to make it wide enough for the strap to slide thru and fasten to the lower edge of the lever at 6″ from the back end.

24. Assemble and strap, buckle and slide loop onto the lever, then pass it thru the mortises in the post and clamp and nail it to the clamp.

25. Fasten the lever to the leg by use of the ¼″ x 2½″ machine bolt. This bolt should not be drawn up tightly



DETAILS OF VULCANIZER. (See Page 365.)

thus allowing the lever to slip in and out of the catch freely. Two nuts may be placed on the bolt to lock it.

26. The nuts and bolt should be oiled and the tenon of the post fit freely so that the clamp and lever may be removed easily and quickly and hung aside when it is desired to use the saw horse for other purposes.

A SMALL VULCANIZER.

Edmund C. Hanley, Muskegon, Mich.

The small vulcanizer, the working drawings of which are here furnished, makes a most practical and interesting project for the student of the pattern shop. The operation of the vulcanizer is simple. The tube to be vulvanized is held between the two parts of the vulcanizer; the patch which has been applied to the puncture and is of uncured rubber is placed so as to come central under the basin containing the projecting pins. The patch is protected from sticking to the metal by covering with a sheet of thin paper. After the tire has been placed and clamped rigidly in place as noted a small amount of gasoline is placed in the bottom of the pan and ignited. The amount of gasoline needed may be found by experimenting until same will burn for fifteen minutes. The tire thus vulcanized should be allowed to remain in the vulcanizer for an additional fifteen minutes which should then be sufficient to have "cured" the patch applied.

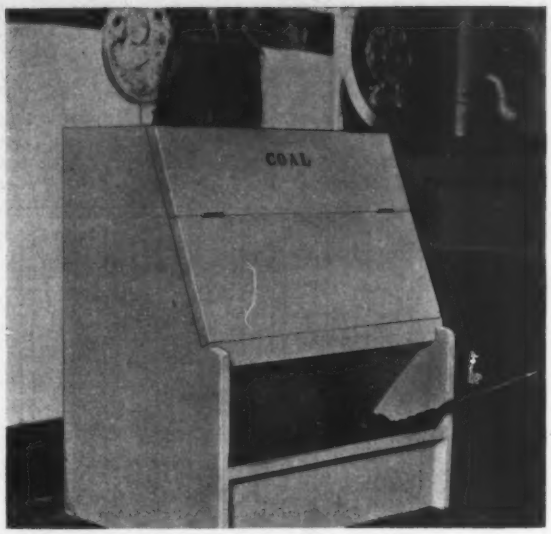
To construct the pattern secure a piece of quarter inch stock of sufficient size on which lay out the outline of the pattern and the location of the numerous holes. The holes should then be bored, taking the greatest care to bore them perpendicularly to the surface. The work can accurately be accomplished on a lathe. The pins may be made from quarter inch dowel rod. They should be placed in a chuck on the lathe and tapered as shown in the drawing. The round part of the rim should be shaped on a lathe from a block of wood attached to a face plate. The two pieces of wood which form the clamp and the base of the vulcanized should be braded together and cut to shape at the same time. Unless the pins are absolutely perpendicular with the base on the finished pattern, it will be almost impossible to secure a satisfactory mold and casting.

COAL BOX.

Howard R. Porter, Ellensburg, Wash.

The coal box illustrated was the result of several pleas from the domestic science department for a more cleanly way of handling their fuel problem. The coal bucket with its attendant dirt and the several-times-daily attention required of the janitor had proved highly unsatisfactory.

The box we designed seems to fill the bill, for it does not scatter particles over the floor, and moreover holds about 150 pounds of coal, making it popular with the janitor. It is intended for steam coal or a very fine lump grade; larger lump coal would require a larger feed opening than the one illustrated.



COAL BOX.

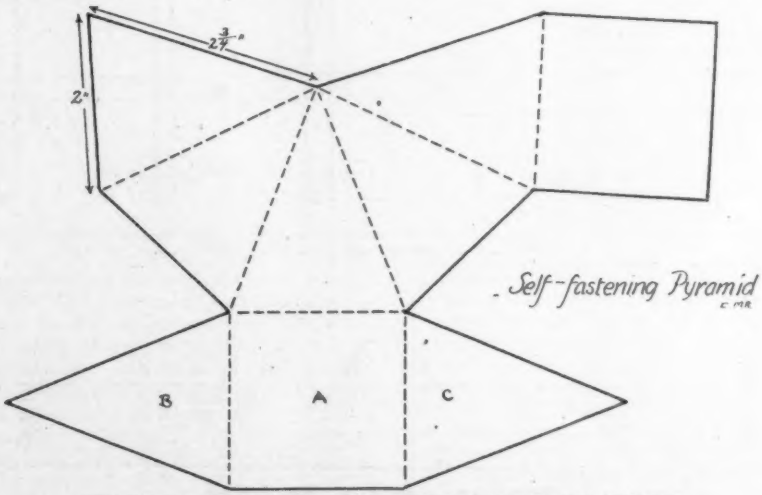
FOLDED PYRAMID.

Mrs. Catherine M. Richter, Des Moines, Ia.

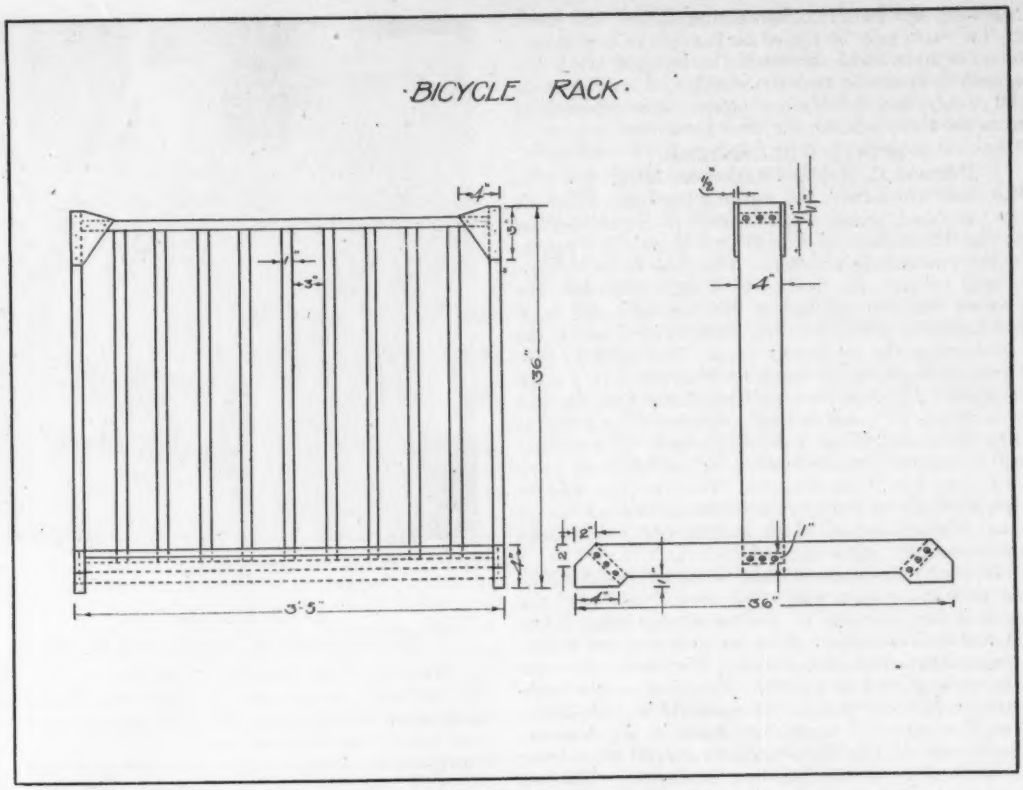
Projects of the nature of the following are very valuable, not only for the processes involved in their making, but also for familiarizing the child with geometric shapes. This one can be made of more interest if given some specific purpose, such as a holder for some article, etc.

This pyramid can be developed, using any triangle, provided it is symmetrical. The model for this one has a base of 2" and sides each $2\frac{3}{4}$" long; so the two squares also have sides of 2" in length, since they are formed by the bases of the triangles. The equilateral triangle can be used, but it does not produce as pleasing a pyramid as when one uses a triangle of smaller base. The one necessity is that the seven triangles and the two squares be placed in the same relation to each other as in the diagram here given.

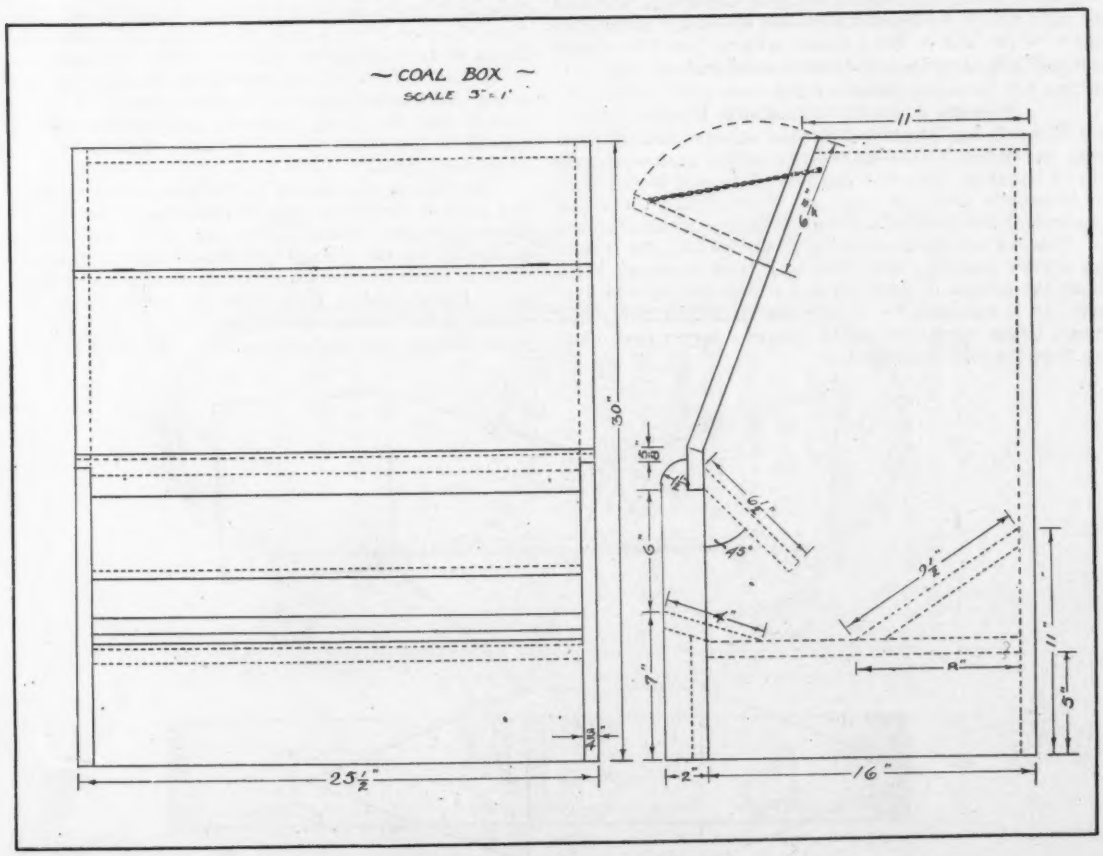
In folding, the easiest way is to hold the square A in the palm of the hand, press in triangles B and C, fold the other triangles around these; and then slip the second square in the slit formed by triangle and the first square. This is much quicker than trying to slip the triangle in last. Before folding the pattern, be sure to score all lines lightly with the back of the scissors, so as to insure an exact fold at the point of pyramid. No paste is required.



DETAILS FOR LAYING OUT AND CUTTING SELF-FOLDING PYRAMID.



DETAILS OF BICYCLE RACK. (See Page 374.)



DETAILS OF COAL BOX. (See Page 365.)

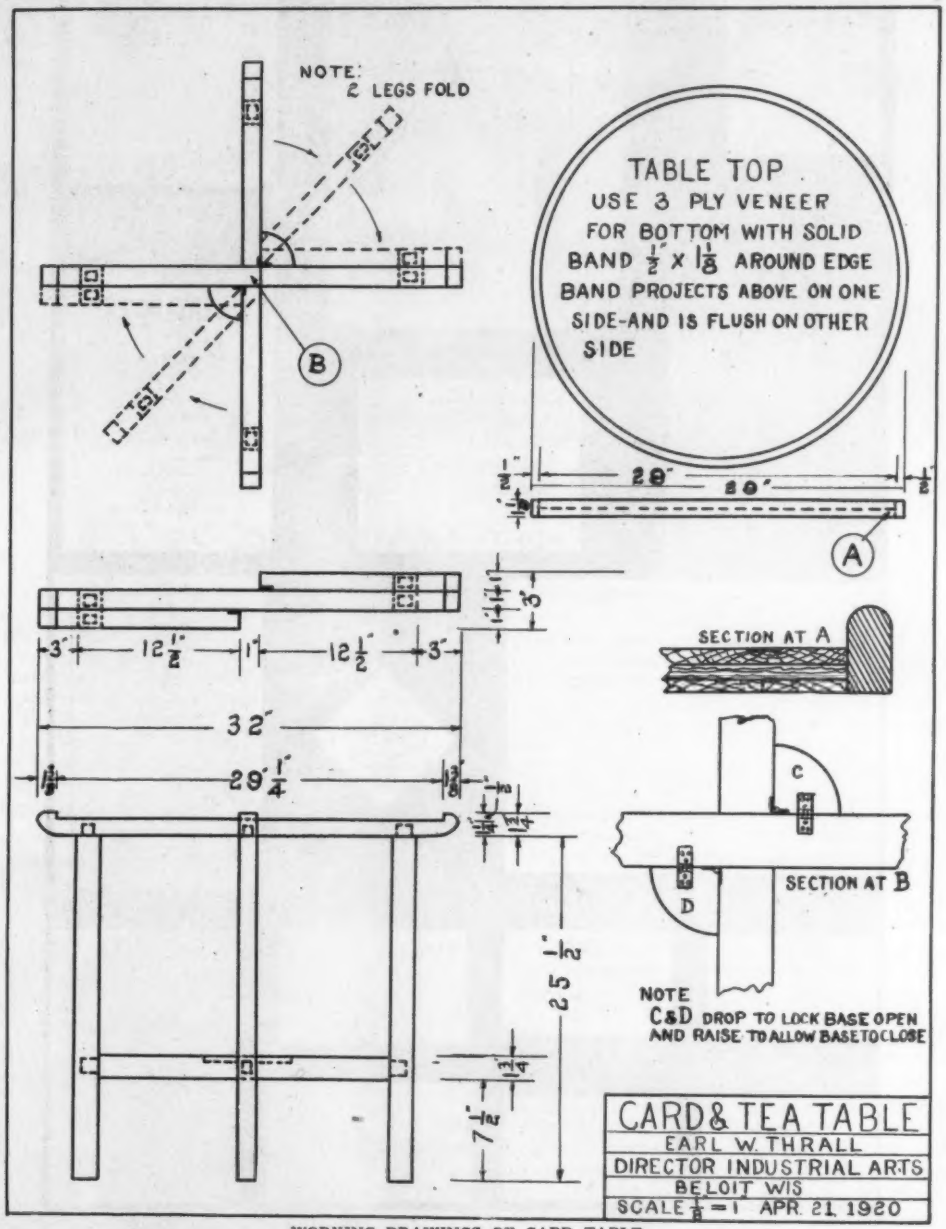
CARD AND TEA TABLE.

Earl W. Thrall, Beloit, Wis.

This card and tea table was designed for convenience as well as to meet the conditons of small living quarters. With its removable top and folding base, it may be put to a multitude of uses, and when not in use, the base may be folded, placed beside the top, and leaned against the wall in some "out of the way" part of the room. In this positon, it will extend out from the wall not to exceed 4½".

We usually make the circular tray from three-ply veneer, with the edge band flush on one side, for games, and extending up one-half inch on the other side, making it tray fashioned for serving. If veneer is not obtainable, or not desired, we have had very good success with gluing up a top of solid boards, using a tongue or dowel joint, and then cut to a perfect octagon. To prevent warping, we next run the top over the dado saw, crosswise of the grain, cutting out a groove ⅜" wide and ⅜" or ½" deep, every three or four inches. Tongues of the same kind of wood are then glued into these grooves with the edge grain up. It may be somewhat difficult to plane this surface down in good shape but a belt sander finishes the job in fine shape. After this, glue and nail on your edge bands.

The construction of the base has many good features. The top pieces holding the tray project beyond the legs, thus putting the legs back far enough to be out of the way when walking around the table. When four people are seated, the lower cross pieces of the base prevent others from getting their feet on your side of the table.



WORKING DRAWINGS OF CARD TABLE.

Because the circular or octagonal top extends out over the lap, it is a very comfortable table to work around and it seats four very nicely. It is solid enough to use for writing or for a study table; it is equally convenient for the sick room, the den, or for the card party. If you wish to serve tea in the parlor, or luncheon on the lawn, take the tray to the kitchen, arrange your dishes and food on it and carry it out. When placed upon the base, you are ready to serve and have made only one trip to the kitchen.

At Christmas time the boys made many of these tables and claimed they proved to be a very acceptable gift to mother or sweetheart.

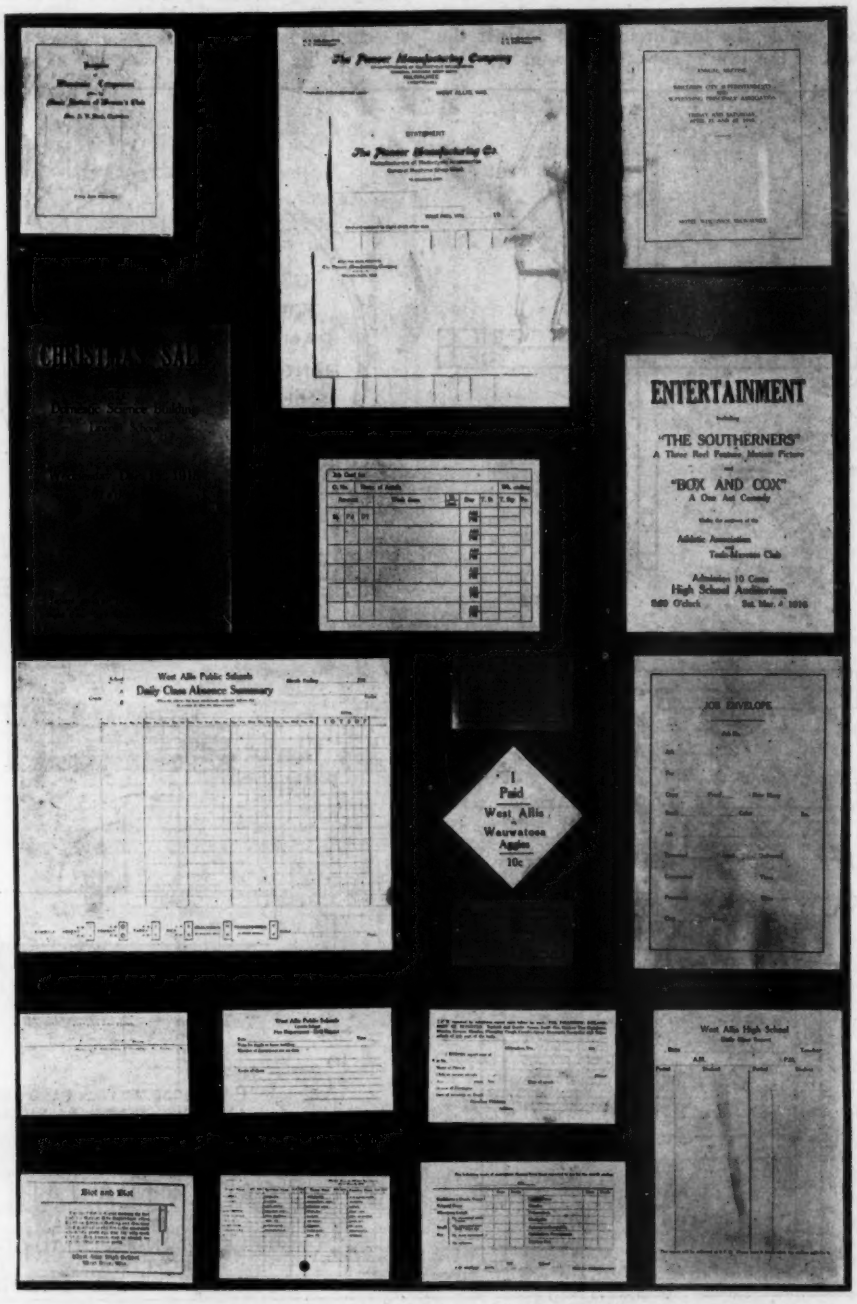
CLEANING PAINT AND VARNISH BRUSHES.

Charles A. Wardner.

Every year many dollars' worth of paint brushes are thrown away. This is true all over the land both in the school and in the home workshop. Brushes become neglected and harden beyond all hope of recovery by ordinary methods.

In one shop a method of softening brushes was accidentally discovered. By dint of pounding and scraping an old brush was partly reclaimed and used in some aluminum paint. Having mixed more of the powder and liquid than was needed, the part not used was poured into a large fruit jar. The brush was also put in the jar and the cover screwed down to prevent evaporation.

A few days later on opening the jar the brush was found to be as soft and pliable as a new brush. All the old paint in it was softened up, even that on the handle,



EXAMPLES OF PRINTING PRODUCED IN THE SCHOOL PRINT SHOP, WEST ALLIS, WIS.

by the fumes of the bronzing liquid or "banana oil" used in the aluminum paint.

A large glass candy jar was then procured and the bottom filled about two inches deep with the bronzing liquid. Into this all the old discarded brushes have been placed, many of them had been neglected and hardened for years. After a few days in this "resurrection jar" the brushes are easily cleaned with a little gasoline.

A CORNER IN THE METROPOLITAN MUSEUM.
Each object shown was designed with some antique museum piece in mind.

A LESSON FROM THE CHEMIST

Richard F. Bach, of the Staff of the Metropolitan Museum of Art

Of all types of activity receiving direct stimulation from the war, none has so well profited by the present isolation of America as the science of chemistry. Official reports for the year preceding last June offer satisfactory information as to the growth of the dyestuffs industry in America. Of aniline dyes, America imported in 1914 products to the value of $7,241,406 and four years later exported similar products to the amount of $7,296,080. There is a sermon in these figures. Four years have accomplished not only a complete neutralization of the former import figures, which may in this case be considered a negative figure on the thermometer of trade, but have in addition witnessed a positive gain above zero of an amount more than equivalent to the previous importation.

A SMALL CABINET (ITALIAN) OF THE SIXTEENTH CENTURY WHICH OFFERS SPLENDID SUGGESTIONS FOR MODERN PIECES.

These coal tar dyes were formerly purchased from Germany. We now make essential colors sufficient for our own requirement and have begun to sell other countries that have not so well profited by the opportunities of the war. In fact, latest reports show that our sales outside the United States are being made at a rate which would be represented by an annual figure of close to ten millions, and this does not account for the factor of acceleration.

For those interested in the industrial arts the initiative of the chemists offers pregnant suggestions. They have taken opportunity by the forelock, have assured American business in a very important field, have patriotically established America in a new branch of commerce, have assured to the American people a decided advantage in the way of American-made colors.

Can we say the same for American furniture, textiles, floor coverings and other industrial arts fields? Have they seen their opportunity or have they been careful to persuade themselves that business will be as usual after the war? Do industrial arts producers in these many fields fondly imagine that all of our friends, the Allies, will go out of business after the war? The same advantage which the chemists saw in America's isolation, our Allies have undoubtedly seen as a menace to their own commercial progress. There will be as many millions of mouths to feed in Europe, there will be as many artisans and workers capable of the highest type of tasteful execution as ever before; there will be put forth as a consequence the utmost efforts to re-establish European leadership in the industrial arts in the American market. The Allies saw three years of war before we entered the ranks; they had therefore three years' time in which to consider what to do when the war should end. As a con-

sequence, it has ended more suddenly for us than for them, and the most terrific current and cross-currents have begun to churn up the smooth course of our business life.

American manufacturers in the industrial arts fields must take advantage of their opportunity to improve their foothold in the markets of the world. American distributors must be convinced that the American public deserves the best; the American people must realize the plus quality of design in their own home furnishings. To this end the American schools must teach taste and appreciation rather than inane drawings without objective in execution. To this end we must make a beginning in training our own designers to provide for our own ends in our own way. To this end all of our manufacturers, designers, artisans, craftsmen, workmen, school children, and all who run and read, must find time to visit the Museums, to take advantage of the enormous opportunities offered not only by the collections themselves but in the way of lectures, study rooms, photographs, publications, expert advice, and many other lines of direct educational usefulness. We have only to consider the work done by the Metropolitan Museum in this connection to be assured of the immediate purpose which actuates our great museums. When the arts of peace will be called upon to restore balance, when these arts begin to function once more as a lodestone of life, the work of the Metropolitan Museum will be rated high.

It is the high duty of craftsmen and women in the various arts of ancient lineage and of honorable history, in their effect upon the growth of civilization, to cherish constantly the ideal of absolute perfection of design and reliability of workmanship, and this duty, like the arts themselves, has changed progressively with each decade of time. In the year 1919 it came to mean that handicraft in itself is not complete as an evidence of human progress in art. This handicraft must also exert its direct effect as a check upon machine manufacture, improving this by excellent example and by faithful practice. Nor should the craftsman wait for the manufacturer to come to him for suggestions; the obvious duty lies in the other direction. The craftsman in lace as in metal and other fields must convince the manufacturer, who must in all cases supply the mass requirements of the people generally, that only the best product in design and execution is good enough for America. The best workmanship and the best design will invariably remain in control of the handicraftsman, but unless he has demonstrated to the manufacturer engaged in mass production the guiding value of his craft as a standard he has performed but the tithe of his mission and his finest work must remain nothing more than a voice in the wilderness.

AN ARMCHAIR OF THE PERIOD OF LOUIS XIV.
A helpful piece for the modern designer in textiles or furniture.

A SHOP KINK.

Cora Warren, Vineland, N. J.

Before the writer left for her summer vacation last spring, she took precautions for properly storing the tools in the manual training department. In addition to cleaning all the tools, each of the edged tools was given a coating composed of one part of plain cosmoline and five parts of coal oil mixed. This coating kept the tools free from rust and they were in good conditon when the school reopened in September. The preparation will keep any tool which is exposed to dampness, free from rust.

AN OLD RUG IN THE COLLECTION OF THE METROPOLITAN MUSEUM.

The Relation of Manual Training to Vocational Education

W. G. Hummel, Director of Vocational Education

We have come to accept the educational fact that there is a place in our public schools for both manual training and vocational courses.

Certain values they possess in common, and certain other values are distinctive of the one or the other. There is no reason for conflict or antagonism between the two types of courses and very little occasion for duplication of work. On the other hand, if the true relationship existing between them is recognized and defined, each can be of very real advantage to the other, and through this relationship each can be strengthened and its effectiveness increased.

Each will, or should, be modified and limited in certain ways by the existence of the other in a school; but in a way mutually helpful, not cramping. Through cooperation each is enabled to concentrate upon and to fulfill its own particular functions more adequately than would otherwise be possible and is freed from pressure tending toward dissemination of its efforts and strength in borderline instruction.

As is well known, during recent years there has been not a little confusion as to the aims and legitimate character of manual training work. The work has jumped about from one thing to another. Some educators have felt that, in order to reach its highest effectiveness, manual training must be vocationalized,—given a distinctly industrial purpose. This has resulted, in some schools, in the installing of a variety of shops with expensive equipment, not all of which, it was often felt, was sufficiently used to justify the expenditure. Manual training thus became so overburdened with trade differentiation that certain phases of its original function were forgotten or at least but slightly considered in practice. Yet at the same time the work did not, as a rule, give satisfactory trade training.

Then came the passage of the Smith-Hughes Vocational Education Act.

And the initiation of the work provided for by this Act brings with it, I believe, a feasible and satisfactory solution or simplification of many problems of manual training instruction.

On the other hand, the existence of the right type of manual training courses affords to vocational education courses an auspicious start and prevents much undesirable waste of time and effort in the strictly vocational work.

A clear understanding of the legitimate functions of manual training and of vocational education makes this evident and indicates the nature of the mutually helpful relationship possible and desirable between them.

The function of vocational education is, obviously, to train skilled workers in a definite occupation. This training, as provided for by the Smith-Hughes Act, parallels the student's general educational training so that while the boy or girl in the high school is getting a degree of training for a definite type of work, he is also receiving a degree of general education for the business of living with his fellows. In carrying on its function, vocational training must necessarily focus the serious attention of its students on the work as a money-making trade or occupation and must endeavor to give them the skills, speeds and habits of thought needed for success in the trades and occupations studied.

As I see it, the functions of manual training are more general in character. It should give some skill in the use of tools and should include particularly such information, experience and skills as are applicable to home needs; but its most valuable functions, it seems to me, are to give a wide view of the industrial world, to develop social adaptiveness, to point the way to different vocations and to assist in the intelligent choice of a life work. This last means that it should discover and weed out those who should not go into the trades and industries as well as discover for other students the particular trades or occupations to which they are best adapted.

The functions of manual training, then, are *extensive*, while those of vocational education are largely *intensive*.

Both are industrial in character. They differ in that one emphasizes above all other things the demands of the vocation and industry, while the other emphasizes especially general social and individual development needs.

The one is directly vocational, the other pre-vocational and supplemental to general education.

The right kind of manual training work guides the boy adapted to vocational work into the right type of vocational training for him. It keeps the boy not adapted to vocational training out of it and directs him to some other kind of life work. It thus strengthens the vocational work by sifting the students who go into it so that it receives only the fit,—and these for the type of work best adapted to them. At the same time it contributes to what we term general education, the needed phase formerly supplied, in part at least, in the home, but now not likely to be secured unless thru the schools. It gives a degree of ability and facility in the use of tools—a certain manual dexterity—which every boy should have.

Vocational courses in a school enable manual training to be released from any necessity in theory and practice for training for specific industries or pursuits and from responsibility to develop special skills. It becomes the duty of vocational training, not of manual training, to give specific information of a strictly trade nature.

The vocational courses by their nature and their additional students justify the differentiated shop which the numbers of manual training students frequently did not seem to justify in the past. At the same time these differentiated shops, necessary to the vocational courses, bring more boys and additional types of boys into the manual training work.

Thru the right kind of cooperation, manual training is enabled to make its aims and practices such that it rightly deserves a place in the school experience of every boy whatever his future work in life. This type of instruction demands, however, that it shall not so emphasize the acquisition of skills that they are ends in themselves. That is for the vocational courses to do. Nor can the work be determined chiefly from the point of view of preparing to enter a trade later.

What is needed is that it should give selected general industrial information and training.

I have sometimes thought that the right kind of manual training course is similar in many ways to the right kind of general science course. Each is a course of general educational value to all pupils whether they are later to specialize in science or in industrial work or not. Each is, in a sense, a "finding" course, searching out special interests and abilities of pupils. Each is intimately related to and applicable to the affairs of every day life. Even the dangers to be avoided are similar in the two courses,—over-accent on the topics of the teacher's special interest, lack of balance, lack of uniformity in a coordinating general plan, etc.

However, this similarity is foreign to my subject and I shall not take time to discuss it.

In closing this brief consideration of the relationship of manual training and vocational training, just a word as to the time given to each: Personally, I believe that there are very few schools where a four year sequential course in manual training is desirable. Grade

work and one or two high school years of manual training should, it seems to me, fill every need for the work. The boy who takes more intends, with almost no exceptions, either to become a mechanic, practice a trade, or to go to an engineering school. If he is to go to an engineering school he may well spend upon mathematics and science that extra time of the last two high school years which might otherwise be spent upon manual training where there is a four-year manual training course. If he is to become a mechanic—to enter a trade—he can most profitably enter Smith-Hughes classes designed especially to train him for his work and to enable him to avoid a long apprenticeship.

As to the strictly vocational courses in the ordinary high schools, there may be cases where a full four years of work is desirable. But ordinarily, it seems to me, that except in the case of agricultural courses, the two or possibly three-year course, preceded by manual training work and supplemented by as much general educational training as can be secured in time free from vocational work, is the desirable arrangement.—*Address.*

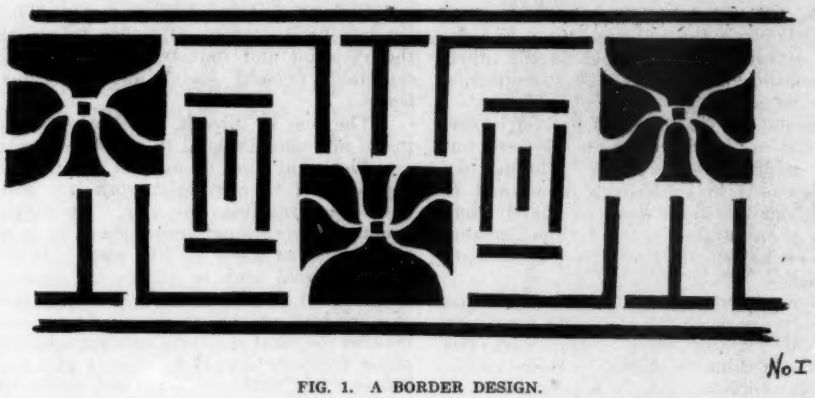


FIG. 1. A BORDER DESIGN.

A FEW WORDS ABOUT STENCILING

Ruth Elizabeth Chamberlin

ONE of the simplest and least expensive crafts is stenciling. It covers a greater territory than most crafts and as it may be applied to so many things, it has become one of the most popular arts of today. Children as well as adults, who do not profess to have the ability of an artist, are able to master stenciling and produce excellent results.

After we decide that we wish to stencil something the first step is the design. In working out or choosing a design, here are a few points that may be of some help.

Does the design fit the shape of the object to be stenciled?

Is the space too crowded or is there too little in it?

Are the background spaces too monotonous or tiresome?

Does it balance?

Is there anything in it that you see when you do not wish to see it?

Are the background spaces more important than the design?

Here is a test for finding the value of a design. Hang it in the room that you frequent most and see if you are tired of it before the seventh day arrives. If you can live with it a week it is pretty safe to use it.

Oftentimes the coloring is the making or marring of a design. Decide first upon the color effect which the completed work shall assume. Select for the larger areas the tone which shall produce the desired result. Put the brightest tones in the smallest spaces. Now that you have your work planned as to material, design, and color scheme, you are ready to begin the real work of stenciling.

First I shall consider the stencil itself. The transferring of the design onto the stencil paper is the first step in the actual work. A blue-purple carbon paper is very satisfactory for transferring for it does not rub off easily. In pinning on the design it is well to pin thru the spots that are to be cut out so as to run no risk of spreading paint going thru the pin holes and leaving untidy specks on the fabric.

In cutting the stencil many people differ about the way one should hold the knife. I believe that the kind of knife and the method of holding it depends upon the individual. I have always used a jack-knife but only as a matter of personal taste. I have found that sheet zinc offers a very good improvement over glass or wood for cutting the stencil on. The zinc does not turn the edge on your knife and besides, it is light and unbreakable. Tools such as wood carving tools are useful in small patterns. (If such tools are used it is better to cut over wood.) A round punch helps to make a stencil look well.

Care should be taken of the cut stencil, keeping it always flat. After each use wipe it off carefully so as to prevent any extra paint from getting on to the material when you next lay it down.

Tube oil paints such as artists use are very satisfactory. They are inexpensive and hold their color and

FIG. 2. BORDER DESIGN.

best of all, withstand laundering. A good medium to use with the paint is turpentine and japan drier in the proportion of one part drier to two parts turpentine. A supply of this can be made and used as needed. When the paint is mixed to the desired color thin it with the medium to the consistency of medium thick cream.

Flat short bristle brushes such as artists use in oil colors are very good, for they can be had in different sizes and they fit into the large and small spots very conveniently. It is best to use a separate brush for each color. If only one brush is used be very careful to clean it when changing colors.

Under the material to be stenciled should be placed a blotter or several thicknesses of newspapers to absorb the paint that soaks thru. Blotters are of great importance in stenciling thin material.

It is well to stencil the largest spots first, for should the paint give out before the design is finished, and the new mixture should not exactly match, it will be less noticeable in a small space. Scrub the paint well into the fabric being sure that the space is evenly covered.

When at last the article is stenciled, place it on an ironing board and cover it with a clean cloth. With a hot iron press it until the paint is practically dry. This takes up all the extra paint and eliminates that undesirable painty appearance never found in the best work. An absolutely flat tone should be obtained. Never pile on the color for it always makes stiff spots, and the charm of stenciling is that it melts into the fabric, leaving the spots of the design a different color but in other respects the same.

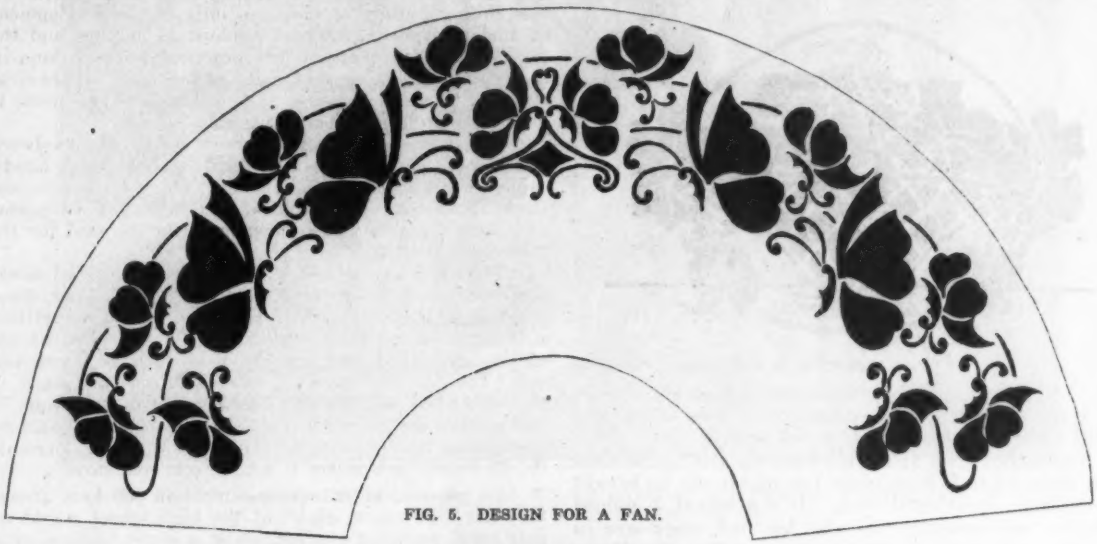


FIG. 5. DESIGN FOR A FAN.

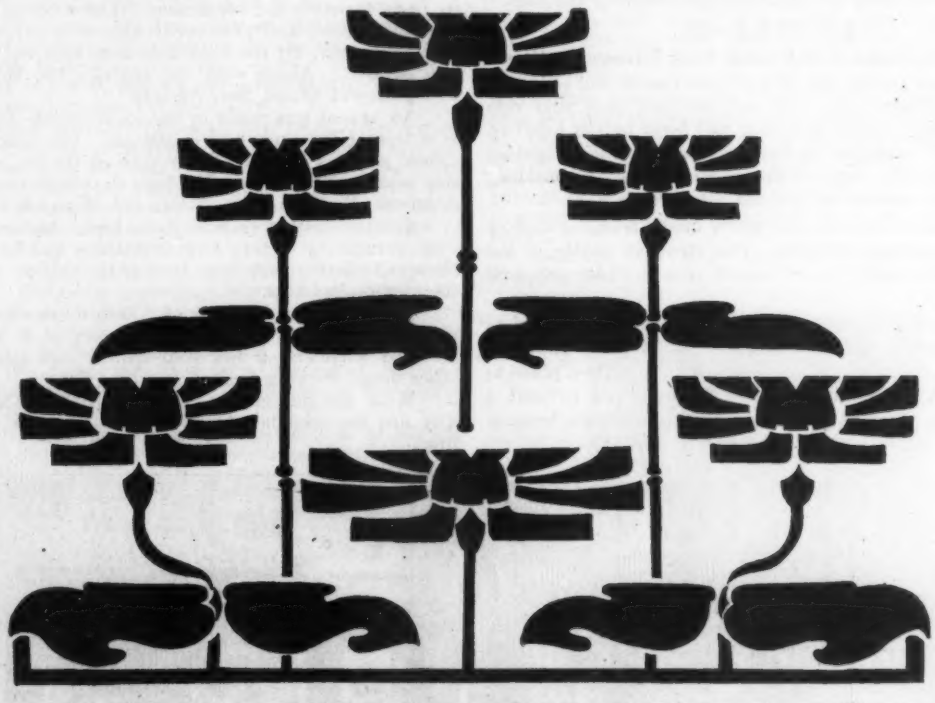


FIG. 3. DESIGN FOR TABLE RUNNER.

The border designs (Nos. 1 and 2) can be used in various ways. In No. 2 the dots in the center of the

flower are put in more successfully if done with a pen free-hand after the design is stenciled.

No. 3 is designed for the end of a table runner, and works out very well on ecru crash.

The old-fashioned deep moulding oval picture frame makes a charming little tray for serving cool beverages on the piazza. Brass handles with wood inserts can be bought for a small sum and add much to the looks of

FIG. 4.

the tray. Design No. 4 stenciled on ecru linen and placed under the glass completes the tray.

The design (No. 5) for the butterfly fan can be used on a plain white bolting cloth fan which can be bought at any large department store. If the stencil is pinned carefully and securely, one who has had experience in stenciling will have no difficulty in stenciling the fan.

BICYCLE RACK.

H. R. Porter, Director of Manual Arts, Ellensburg, Wash.

This has proved one of our most useful and practical problems. There are about one hundred boys who ride wheels to high school and they had been in the habit of leaving the machines at various angles leaning against the building. To improve the appearance of the building and grounds we decided to build a bicycle rack.

The rack is quickly and easily made, being of nail or screw construction thruout. The stand is neater if the outside frame uprights are halved into the base supports or feet.

The lateral dimensions of the rack can be changed to accommodate any number of wheels, but the size shown is very convenient since it can be easily moved from place to place. Full inch pine was used thruout and painted a dark green. The rack is popular with the boys because they like to see their "steeds" properly stabled.

SUCCESSFUL GAS-ENGINE WORK.

J. R. Vertrees, Monmouth, Ill.

The rapidly increased use of the internal combustion engine in every community is demanding some knowledge of its theory of operation and the ability to repair it to a certain extent.

Because of this general interest, the Monmouth High School, about two years ago, began a course in gas engines and farm tractors, including some metal work. In this course a study is made not only of the development of various types of internal combustion engines and the theory of their operation, but practical work is done in the repair of gas engines and tractors and in practical study of their mechanism and operation. The work is made as thoroly practical as possible.

Last year the work was carried on in the woodwork bench room, but this year the work was seriously handicapped because of a lack of room. One of the two coal sheds at the rear of the building was not in use this year and accordingly it was decided to fit up the shed for the gas-engine department.

The shed was 18′x80′. The boys of the wood working department put in nine windows, a single door, lined one-half of the shed with shiplap, and put in a partition with large double doors, each half 4′x7′. Then at the end of the unfinished part another pair of large doors was cut. By this arrangement sufficient room was given in the unfinished end to store six cars, and room enough in the finished end to work on two. The room is heated by a soft coal furnace without the sheet iron jacket around it. In reality this makes it a large soft coal stove.

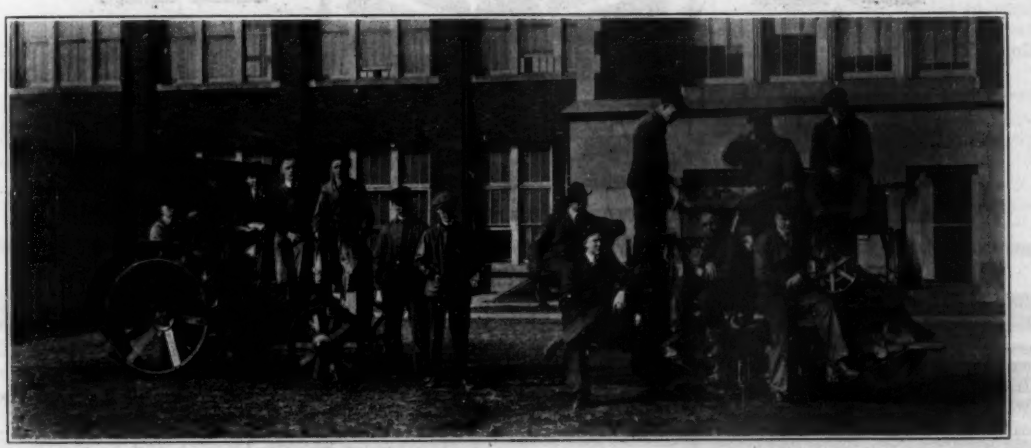
In response to an announcement in the local papers that the "gas-engine class" of the high school would repair small pumping engines, about a dozen engines came in from farmers and local men. The engines were first thoroly cleaned, and were studied in connection with our textbook work. By the time they were repaired the theory was covered. Along with the engines, the boys learned to repair and adjust their "Fords."

An appeal was made to the local dealers for the loan of a tractor for study and operation. The unanimous response gave us the use of any type of tractor, and so far this year we have taught the boys to operate the Fordson, Sampson, Waterloo Boy, Titan and Monarch Caterpillar.

Several tractor schools have been conducted at the local garages by factory representatives, and by attending these schools the boys have been more able to understand the various tractors.

The work can be done at a minimum expense since all the equipment absolutely necessary is a handful of assorted wrenches, a few cold chisels and punches, and other metal working tools.

With the gas engine in every part of the country, why are the schools so slow to take up work along this line?



STUDENTS OF THE MONMOUTH HIGH SCHOOL OPERATING A FORDSON TRACTOR AND A MONARCH CATERPILLAR.

A GAS ENGINE CLASS IN THE MONMOUTH HIGH SCHOOL OVERHAULING PUMPING ENGINES SENT IN BY NEIGHBORING FARMERS. (See Page 374.)

Courses for Shops and Stores.

Some five years ago the National Retail Dry Goods Association inaugurated a movement designed to secure local school boards thruout the country in furthering instructions in merchandising and salesmanship. Progress in the direction named has been slow.

The school board of Cleveland now proposes to undertake the task and Superintendent R. G. Jones has arranged a course of business instruction on the lines above indicated. High school students will be instructed in selling lines, and there will be part-time courses in the large retail stores and other classes arranged for the benefit of store workers.

The Cleveland School of Art is to open a special course for designers in conjunction with the Cleveland Garment Manufacturers' Association. Western Reserve University is to add to its special courses in business training by courses in marketing and distribution of products of the farm and industries, insurance, business management and investments. The scope of the course in accounting has been enlarged.

Scientific analysis of business problems is to be provided in greater degree thru several additions to that faculty. The practical side of business problems is made known to students thru lectures by business leaders. Labor problems and their relation to the industries also are studied, as well as public finances, international trade and problems of public utilities.

Assistant Teachers for Public Health Service Hospitals.

The United States Civil Service Commission will hold examinations for assistant teachers in commercial, agriculture, trade and industrial, and technical subjects, to fill vacancies in the Federal Board for Vocational Education for duty at the public health service hospitals in the field. Applicants should apply for Form 1312, stating title of examination desired, to the Civil Service Commission, Washington, D. C., or the Secretary of the United States Civil Service Board, in Boston, New York, New Orleans, Philadelphia, Atlanta, Cincinnati, Chicago, St. Paul, Seattle, St. Louis, San Francisco. Applicants will be rated on the basis of physical ability 10, education, training and experience 90. Applications for the examinations will be received by the Commission at Washington, D. C., until October 1, 1920, and papers will be rated promptly and certification made as the needs of the service require. Competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

An assistant teacher of trade and industrial, and technical subjects must have completed the first five grades of common school together with (a) additional instruction in either technical or trade and industrial courses, or (b) the completion of an organized apprenticeship course of not less than three years' duration, and, in addition to (a) and (b) at least two years' experience in the pursuit of the trade or occupation studied, or two years' teaching experience in technical, trade, or industrial subjects.

Teachers will receive salaries varying from $1,400 to $1,800 a year.

MR. UEL W. LAMKIN.

Director of Vocational Education, Federal Board for Vocational Education, Washington, D. C. Mr. Lamkin was appointed in July to succeed Mr. C. A. Prosser, first director under the Smith-Hughes Law.

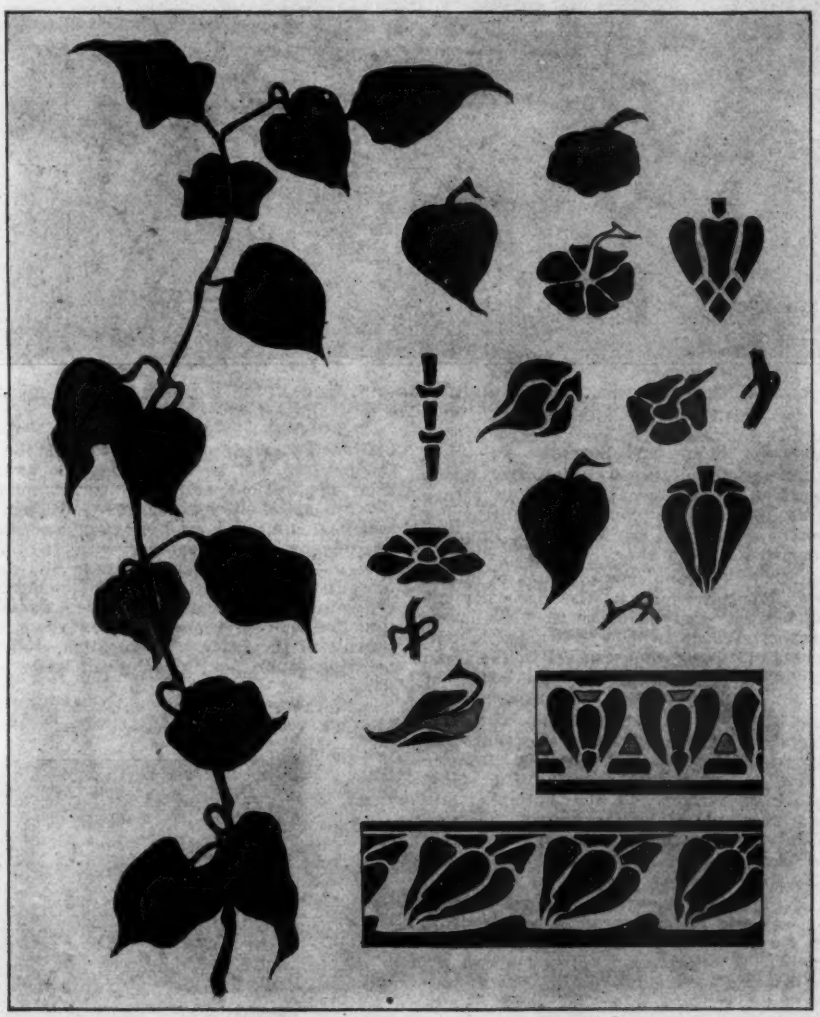
ASSEMBLY TEACHING OF ART.

Florence Newcomb, Washington Irving High School, New York City.

Few teachers of art are satisfied with the scope of their work in the classroom. Most of those who have not lost, thru years of routine, the fire of artistic enthusiasm desire to justify their teaching by imparting to their pupils some appreciation of the world of art and of art in the world—some understanding of the possibilities for enhancing life thru the enjoyment of beauty as expressed by the fine arts. In the short lesson periods there is little chance for giving more than a glimpse of this big and vital thing, because a concrete, practical result must be forthcoming from every forty minutes. Besides, comparatively few students carry drawing beyond the third year, and most of them have only the first two terms. Hence, the classroom teaching as a means of touching this phase of art is almost negligible.

In the Washington Irving high school we have decided that assembly programs offer the best opportunity for giving this cultural work effectively. In the beginning a few teachers who were particularly interested gave lantern talks or demonstrations, and friendly artists were asked to come and talk to the girls. Both of these ways were found to be excellent. Now, however, in conforming to the custom of the school, the teachers do not lecture in the assembly, for the programs form a part of the declamation course; and, whatever a subject may lose by being presented by one who has no marginal knowledge, it gains by the necessary simplifying of the material into one or two points, thus making it more intelligible to the audience, while at the same time the pupil gets experience in public speaking.

For the past three years the assembly teaching of art has been organized as a part of the instruction. Every teacher is expected to plan a program, a method which yields diversity of topic and treatment, and which divides the work so that the task of each is light, especially since the time allotted to a talk in the assembly is only fourteen minutes.



Designs by Miss Rachel Skinner, Instructor of Art, High School, Champaign, Ill.

As a rule, the teachers prepare the subject matter, giving the girls their facts, then passing them on to the declamation department for rehearsal. Sometimes, in the special art classes, the students write the lecture themselves from material they have looked up and had reviewed by the teacher, and sometimes it forms the subject of a class recitation. Both of these methods are more educational, but are not so practicable as the one first mentioned for the majority of classes.

Many of the talks are illustrated with lantern slides, which may be borrowed from the Metropolitan and Natural History museums. Occasionally, slides of local architecture have been rented from private concerns for a small sum. Some of the most popular programs, how-

ever, have been those which were illustrated by quick demonstration drawing in colored chalks or tempera; and, those told as stories were a joy to the girls.

The aim is always to make clear two or three fundamental points in the most concise but interesting way. The subjects have ranged over a wide and comprehensive field, for in their choice, the teachers have expressed their particular enthusiasms for certain phases of art and presented them from their individual points of view. At times, tho, the topic was chosen because of its close connection with the working problems of the class; at other times it furnished a background for classwork, thus broadening the understanding and showing the relation of simple school art to the higher manifestations. For example, a talk on the art of lettering by a commercial-art class gave the first term pupils an idea of the artistic possibilities and technical refinements in this less attractive but necessary exercise.

Every term's program has included a summary of the history of painting, architecture, and sculpture, viewed from various interesting angles. Examples of architecture showing characteristic features of different periods was found to be interesting for, after the lecture, when questions were asked, there was a ready response. When there are a few spare moments, this open discussion is excellent, as it helps to crystallize the important points in the minds of the pupils. Another live topic was one identifying types of New York architecture with historic periods and pointing out the beauty of familiar buildings, the Renaissance origin of brownstone fronts and apartment houses, the mediaeval prominence of our Gothic churches and office buildings, and the Greek and Roman precedents of our classic libraries and stations.

The principles of design as shown in great works of architecture, sculpture and painting are very valuable topics for relative illustration and to emphasize and clarify the universality of the principles of art.

A talk on what to look for in pictures is a subject always enjoyed. Great portraits, animal paintings, still life, landscapes and children in art are good story-telling topics. All of these, as well as schools of painting of different countries and periods, were some of the topics for lantern slide lectures. One landscape talk was based on composition lines and masses, another on nature's moods expressed in atmosphere. Periods in furniture and costume were other popular subjects, the latter being illustrated by drawings.

Last year a lecture on Chinese influences in modern design and another on Indian influences were beautifully demonstrated in tempera by technical art classes. "A visit to the museum" is a topic which stimulated interest in the School Art League lectures, when given early in the term. Once, a visit to the zoo was sketched by girls and was most enthusiastically applauded, the lecture disclosing the joy of using a sketch book.

Series of talks around a center, given by several teachers, have been most successful. American art as a center included the art crafts, pottery, weaving, basketry and silverware; the development of sculpture and the distinctive styles of American architecture, Spanish mission, Colonial and modern. In this series some of the teachers became so ambitious that they used drawings, examples and slides for the illustration of their programs, while some of the arts-and-crafts series were illustrated by articles loaned by the Natural History Museum and the National Society of Craftsmen.

At times speakers have been invited from the outside—specialists, professional artists and critics—every one of whom has accepted, and some have taken great pains to bring illustrative material upon the subject he was asked to talk about. From the girl's point of view, those whose talks have been most worth while were the artists who gave practical demonstrations of their work, such as etching, sketching, or modelling. Recently a sculptor came with clay and a stand and, to the students' delectation modeled a bust from life while talking about the artist's enjoyment in his work, his philosophy, and the possibility of self-expression thru art. This use of an outside speaker accomplishes two things, for it interests artists in the work of the public schools and presents the authoritative experience of the professional as a standard for the students to attain.

Finally, the most worth while and vital motive for this form of teaching, which should be an inspiration to all art teachers, is the undeniable result it will have thru the cultivation of an informed, discriminating and demanding public for a future development of art.—*High Points.*

Bag designed and made by Miss Rose Lundborg, Student, Northern Illinois State Normal School. Miss Merritt, head of Art Dept.

Thru an unexplainable error, the exhibit of manual training work, illustrated in the July issue of the Magazine, on page 264, was mis-labeled.

The exhibit was made by the manual training department at Durango, Colo., and was arranged by Mr. F. A. Rodecker, head of the department.

The gavel which opened the Democratic National Convention at San Francisco was made in a Davenport, Iowa, school. It is most fitting that the emblem of authority should emanate from a school.

The city council of Malden, Mass., is criticising the cooking schools of that city, President Robert H. Newcomb characterizing it as "flub-dub cookery" and Councilman Joseph Hoffman declaring that his sister, who is a student in the class, brings home "queer looking messes" but cannot cook corned beef and cabbage and knows nothing, apparently, about preparing a single item of hearty food.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Refinishing Mirrors.

79. Q:—Will you please give me information as to refinishing mirrors properly?—*M. H.*

A:—The process of refinishing mirrors requires too lengthy an explanation for this column. The most satisfactory outline of the standard methods will be found in Schmidt's Problems of the Finishing Room, (Periodical Publishing Co., Grand Rapids, Mich.), page 407; 1995 Paint Questions Answered, (The Painters' Magazine, New York City), page 584; The Scientific American Cyclopedia of Formulas, (Munn & Co., New York City), pages 500 to 507. Brashear's process is perhaps the best of those described in the last mentioned book.

Decorating Silk and Straw.

88. Q:—The writer is a good freehand draftsman and intends to try his hand in decorating silk and straw hats in colors. What material would you advise me to use in such work?—*F. T.*

A:—Stenciled designs in dyes will give pleasing results on silk or closely woven straw of light tone. Aniline dyes may be secured at paint stores or of dealers in art supplies. A tough, thin paper may be prepared for stenciling by painting it with a coat of boiled linseed oil and a little Japan drier. The color may be applied with a stencil brush or with an atomizer.—*E. J. Lake.*

Books.

93. Q:—I should like to have particulars and prices of some of the textbooks quoted in an article in the July issue entitled "Courses for Rehabilitation."—*C. L. G.*

A:—*Edminster's Architectural Drawing*, $2.00, David Williams Co., N. Y.; *Ketchum's Design of Steel Mill Buildings and the Calculation of Stresses in Framed Structures*, $4.00, McGraw-Hill Book Co., N. Y.; *Comstock's Bungalow's, Camps and Mountain Houses*, $2.00, Wm. T. Comstock Co., N. Y.; *Arthur's New Building Estimator*, $3.00, David Williams Co., N. Y.; *Dooley's Vocational Mathematics*, $1.00, D. C. Heath & Co., Boston, Mass.; *Pratt's Materials and Construction*, 90c, P. Blakiston's Son & Co., Philadelphia, Pa.

Violin Construction.

97. Q:—Kindly let me know of any publications on Violin Construction.—*C. R. S.*

A:—*Violin Making*, The Strad, London, Eng. Obtained thru G. E. Stechert & Co., New York; *Violin Mastery*, F. H. Martens, $2.50, F. A. Stokes, New York.

See also illustrated article in the Industrial-Arts Magazine, April, 1918, page 159.

Aniline Bleeding.

95. Q:—Can you give me the most effective antidote for aniline bleeding thru paint? The walls under discussion were originally finished in a blended effect and white was wanted. I painted the walls with aluminum paint and thought I had killed the dye. There was no sign of trouble for about three months. Now the dye is coming thru again. I have these walls to do over and will be indebted for a good treatment. I thought of giving them two coats aluminum.—*G. H.*

A:—Give these walls two coats of Pratt & Lambert's Cement Undercoater which is specifically designed to correct such troubles as the correspondent has experienced. Following the undercoater any color treatment may be used. It is the writer's experience that this undercoater will effectively prevent the different types of staining to which walls are subjected.—*Ralph G. Waring.*

NEW BOOKS.

Color Schemes for the Home and Model Interiors.

By Henry W. Frohne and Alice F. and Bettina Jackson. 99 pages. J. B. Lippincott Co., Philadelphia, Pa.

This practical book offers, in Part I, a statement of the principles of design and of color harmony on which are based the selection and arrangement of furnishings and fabrics for the interior decoration of the home. Diagrams of colors are given to show a simple way of determining color combinations for the choice of furnishings and fabrics that will give a harmonious and suitable effect.

Part II offers twenty schemes in the combination of suitable materials for wall hangings, rugs, portieres, and upholstery, illustrated by colored plates taken from the actual fabrics. There are also shown in monochrome, from photographs, twenty rooms of distinctive style in design, to which the hangings may be suitably applied.

A clearer, more helpful collection of plates could scarcely be selected for class instruction in home decoration. The book is a splendid addition to that much needed material in teaching the selection of harmonious home furnishings. It should be available to every class studying home decoration.

Talent in Drawing.

By Herschel T. Manuel, Ph. D. Cloth, octavo, 162 pages. The Public School Publishing Co., Bloomington, Ill.

This book presents the results of the author's extended use of tests to discover the nature of special ability in drawing. The study was made in 1916 and 1917 and consisted of a long series of tests applied to nineteen students recommended by their teachers for their ready, effective work in drawing. The tests sought to discover (1) general intelligence, (2) higher thought processes, (3) memory and learning, (4) reading, (5) observation, (6) sensory discrimination, (7) physical and motor ability, (8) writing and drawing ability—and the effect of all these factors upon the general ability in drawing. The results obtained were in some cases surprising and in every way valuable as giving teachers a basis for studying the relation of psychophysical characteristics and abilities to talent in drawing. Just a few of the eighteen specific conclusions of the author may be of interest here:

"A certain elementary ability in graphic representation, such as is required for success with elementary-school drawing, is independent, or partially independent, of general intelligence."

"General intelligence conditions the ability of drawers (a) to acquire the advanced technique into which conceptual factors enter, and (b) to create original drawings of merit."

"The motor ability which underlies talent for drawing is specific rather than general; talent for drawing does not presuppose a general motor superiority."

"Achievement in handwriting and ability to drawing are relatively independent of each other."

"Our 'introspective' records do not support the view that superior clearness of visual (or kinaesthetic) imagery is essential to talent in drawing."

"Tests of the memory for visual forms have value in determining the characteristics of one's drawing ability; but one may have a certain ability in graphic representation without a good memory for visual forms, other than the immediate memory required in looking from the object to the drawing surface."

"No clear relation is apparent between ability in drawing and the invention from graphic forms which was required in our tests."

"There is no one psychophysical constitution for talent in drawing; the essential characteristics vary with the type of talent possessed."

It would appear that the author's program for a program of simple tests to diagnose talent in drawing should be developed for its value in vocational guidance.

Supt. Wm. R. Peck of Holyoke, Mass., is barred as executive officer of the Holyoke Vocational School in a recent decision of the state's attorney general. The decision means that there are in reality two superintendents, Supt. Peck of the academic or general school system, and Director M. S. Herbert of the Vocational School who acts as executive officer of the vocational trustees. The situation is attributed to the failure of the trustees to elect the superintendent as executive officer.

Lynn, Mass., maintains jointly with the state a shoemaking school. The boys are not only taught shoe making but the essentials for becoming foremen and superintendents.